

**CHAPTER**

# **49**

**AIRBORNE  
AUXILIARY  
POWER**

DOUGLAS AIRCRAFT CO., INC.  
**DC-8 SEVENTY SERIES**  
MAINTENANCE MANUAL

HIGHLIGHTS

TO: ALL HOLDERS OF DC-8 SEVENTY SERIES MAINTENANCE MANUAL

CONCERNING: REVISION 19, CHAPTER 49, DATED: APR 1/88

49-CONT REVISED TO PROVIDE NEW GENERIC TABLE OF CONTENTS.

49-IDENT REVISED TO PROVIDE NEW GENERIC AIRCRAFT IDENTIFICATION LIST.

49-00 H/P REVISED PARAGRAPH 1.A. step (4) to state "...if fuel is present...".

49-00 Serv. PARAGRAPH 3.7. - DELETED NOTE PERTAINING TO USE OF CORROSION-PREVENTATIVE MIXTURE IN ENGINE.

MANUAL UPDATE INSTRUCTIONS

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C H A P T E R 49

A U X I L I A R Y P O W E R U N I T

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AIRPLANE IDENTIFICATION

Manufacturing Series	Factory Serial Numbers	Fuselage Numbers
DC8-71	45983	350
DC8-73CF	45990	375
DC8-73CF	45991	380
DC8-71	45993	382
DC8-71	45994	387
DC8-71	45995	388
DC8-71	45996	397
DC8-71	45997	398
DC8-71	45998	399
DC8-73CF	46001	395
DC8-73CF	46002	394
DC8-73AF	46003	401
DC8-73AF	46004	403
DC8-73AF	46006	413
DC8-73AF	46007	422
DC8-73AF	46008	423
DC8-72CF	46013	427
DC8-71	46014	400
DC8-71	46018	420
DC8-73AF	46019	411
DC8-71	46029	425
DC8-71	46030	426
DC8-73	46033	431
DC8-71	46039	448
DC8-71	46040	449
DC8-72CF	46043	443
DC8-73AF	46044	432
DC8-73CF	46045	441
DC8-73CF	46046	444
DC8-73CF	46047	447
DC8-71	46048	450
DC8-73CF	46049	479
DC8-73CF	46051	440
DC8-73CF	46052	442
DC8-73	46053	446
DC8-71	46055	492
DC8-71	46056	495
DC8-73CF	46059	456
DC8-73CF	46062	486
DC8-73	46063	457

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AIRPLANE IDENTIFICATION

Manufacturing Series	Factory Serial Numbers	Fuselage Numbers
DC8-71	46064	459
DC8-71	46065	460
DC8-71	46066	462
DC8-72	46067	455
DC8-71	46072	477
DC8-73CF	46073	485
DC8-73AF	46074	468
DC8-73	46076	451
DC8-73AF	46080	466
DC8-72	46081	471
DC8-72	46082	458
DC8-72	46084	473
DC8-73CF	46086	478
DC8-73CF	46087	454
DC8-73CF	46089	501
DC8-73CF	46090	504
DC8-73CF	46091	519
DC8-73CF	46094	482
DC8-73	46095	497
DC8-71	46099	507
DC8-73	46100	502
DC8-73CF	46101	489
DC8-73CF	46103	483
DC8-73CF	46104	480
DC8-73CF	46106	490
DC8-73CF	46108	522
DC8-73CF	46109	493
DC8-73CF	46112	520
DC8-73CF	46117	525
DC8-73	46123	508
DC8-73	46124	511
DC8-73	46125	515
DC8-72CF	46130	542
DC8-73CF	46133	534
DC8-73CF	46135	531
DC8-73CF	46140	528
DC8-73CF	46149	538

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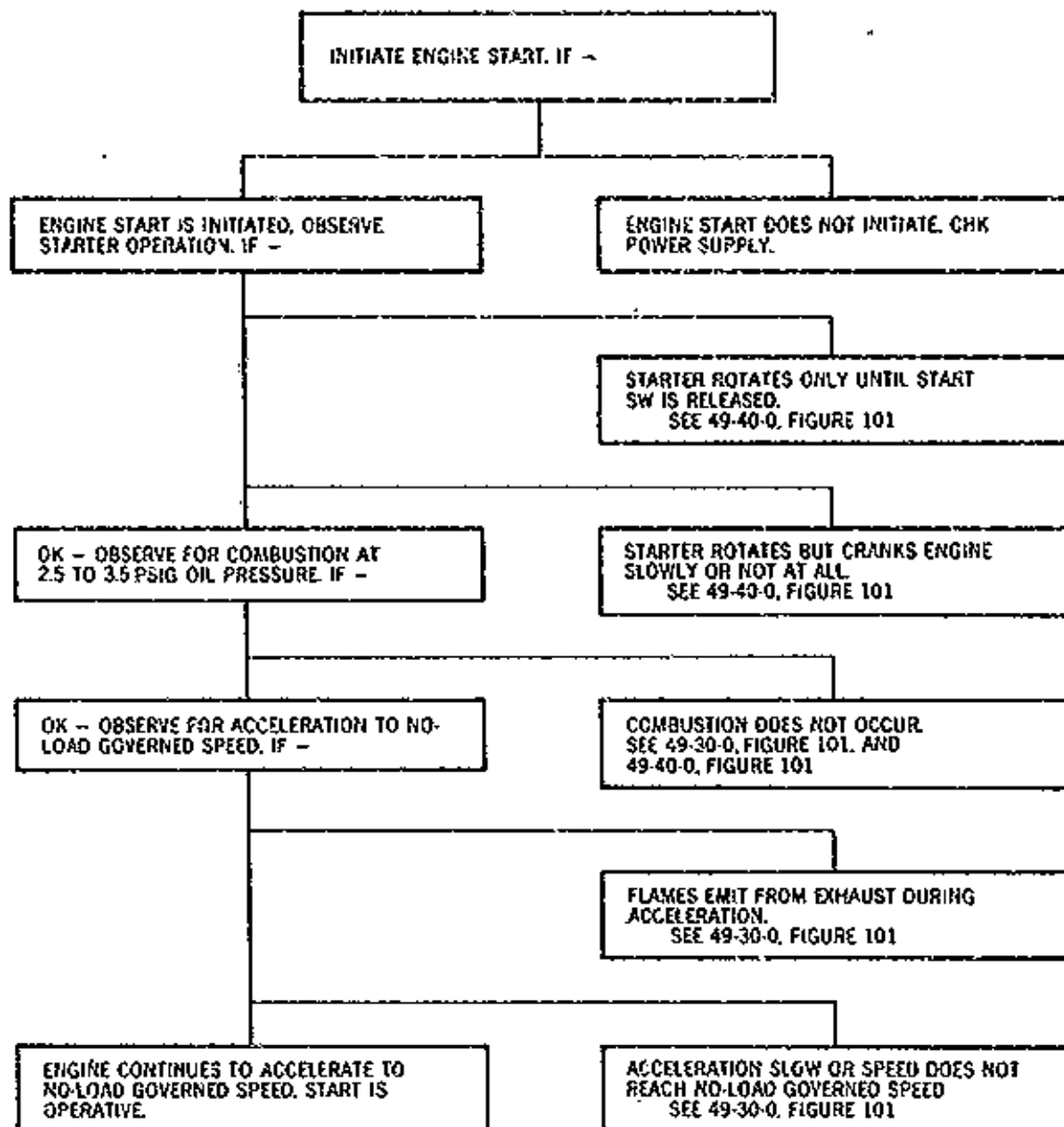
GENERAL - TROUBLE SHOOTING

1. Description

- A. Step-by-step trouble shooting procedures for the APU are facilitated if suspected malfunctions are first isolated to specific systems. Systems for which trouble shooting information is provided are: fuel ignition, starting, air, and oil.
- B. Figure 101 provides a key to sections in this chapter where detailed trouble shooting procedures are outlined. Each referenced figure applies only to the system covered by that section. Probable malfunctions are arranged in the sequence most likely to occur when starting, operating, or shutting down the APU.

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1 A. Engine Start Trouble Shooting

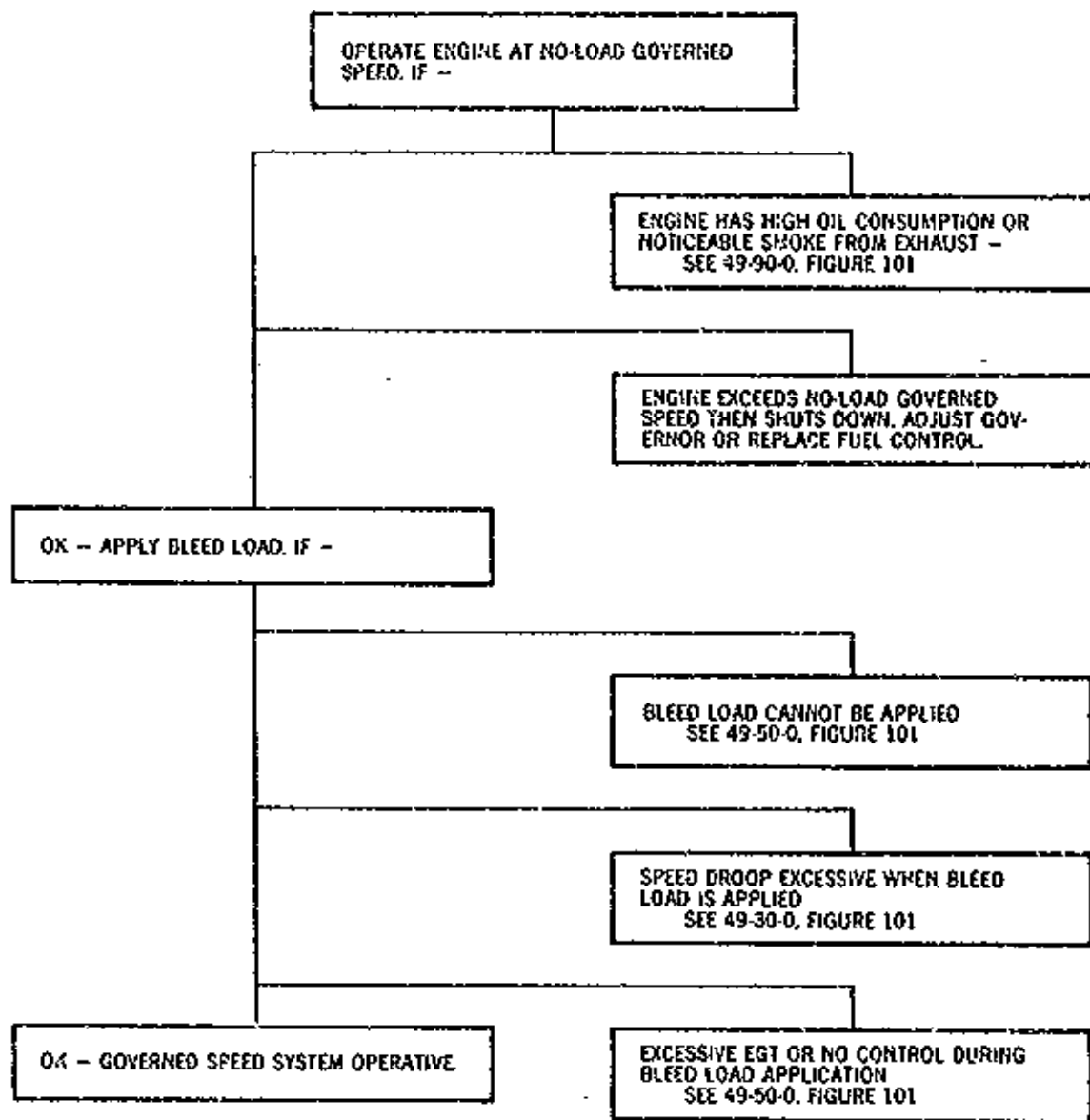


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General -- Trouble Shooting  
Figure 101 (sheet 1)

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1 8. Engine Governed Speed Operation Trouble Shooting



11A2 8301

General -- Trouble Shooting  
Figure 101 (Sheet 2)

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GENERAL - MAINTENANCE PRACTICES

1. General

A. Personnel should read and understand the following instructions before operating or performing maintenance on the APU.

- (1) The APU inlet and exhaust areas should be cleared of personnel, foreign objects, and loose equipment before starting APU.
- (2) All systems associated with the APU should be serviced before operation.
- (3) All overboard drains should be open and free of obstruction.
- (4) The push-to-drain valves located at approximately fuselage station 675 should be checked. If fuel is present, the APU module, and fuel fittings should be checked for leaks and leaks corrected. This check should be accomplished as a normal preflight operation.
- (5) Maintenance should not be performed on any APU system while APU is in operation.

WARNING: PERSONNEL SHOULD STAND CLEAR OF APU INLET, TURBINE EXHAUST, AND PLANE OF ROTATION OF COMPRESSOR AND TURBINE BLADES.

CAUTION: HIGH ENERGY ELECTRICAL STARTERS ARE EASILY OVERHEATED AND CONSEQUENTLY, ARE EASILY DAMAGED. TO PREVENT DAMAGE TO STARTER, DO NOT EXCEED STARTER DUTY CYCLE OF 1 MINUTE ON, 4 MINUTES OFF.

CAUTION: DO NOT OPERATE APU WHEN FLAMMABLE FLUID IS BEING USED WITHIN VICINITY OF APU. (AREAS NEAR MAIN AIR INLET, COOLING AIR INLET AND EXHAUST DUCT).

CAUTION: NEVER SPRAY FLUID INTO APU MAIN AIR INLET OR COOLING AIR INLET AT ANY TIME.

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2. Flight With Auxiliary Power Unit (APU) Removed.

A. The aircraft can be operated with one, two or no APU (s) installed. This provides the flexibility of removing the APU or APU's for servicing and still allow the aircraft to operate in airports with ground air and power units. The following procedures are required for flight under these conditions:

- (1) Identify inoperative APU or APU (s) by placarding control panel in flight compartment. Placard may be in form of masking tape with word "INOPERATIVE".
- (2) Open following circuit breakers for particular APU to be decommissioned.

APU CONTROL  
FIRE HORN  
APU FIRE DET  
APU EXT BOTTLE

- (a) Install clamp (HPV-5N, Burndy) on open circuit breakers to prevent accidental closing of circuit breakers.
- (b) Tag circuit breakers as follows:

WARNING: DO NOT CLOSE CIRCUIT BREAKER. CIRCUIT BREAKER MUST REMAIN OPEN UNTIL APU IS OPERATIVE.

- (3) Remove APU module (s) in accordance with 49-10-0, page 201, except for following:
  - (a) Do not remove inlet air plenum.
  - (b) Remove exhaust system eductor only.
- (4) Install protective caps on all electrical connectors, and coil and stow APU module electrical wiring.
- (5) At starter relay box, (A-2 for single APU, and A-3 (left) and A-4 (right) for dual APU's, disconnect wire Vill3G22 from terminal No. 13 on I-1 terminal strip, coil and stow.
- (6) Isolate fuel system as follows:
  - (a) Single APU - Two methods can be utilized to isolate fuel system.
    - 1) At front spar (between stations 321.563 and 328.126), install isolation plate (87016-700) between flanges of solenoid valve and fuel line (87774-5)(see Figure 201).



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- 2) At right wing root fillet area (leading edge between stations XFS 0.0 and XFS 10.50), disconnect fuel line (87774-11) from reducer fitting. Install AN929-8 cap or reducer fitting.

(b) Dual APU's - isolate both, left, and right fuel system as follows:

- 1) To isolate fuel system for both APU's - accomplish paragraph (6) (a) 1).
- 2) To isolate fuel system for left APU only - accomplish paragraph (6) (a) 2).
- 3) To isolate fuel system for right APU only - at right wing root fillet area (leading edge, between stations XFS 0.0 and XFS 16.125), disconnect fuel line (87774-15) from tee fitting. Install AN929-8 cap on tee fitting.

NOTE: If desired, both APU fuel systems can be isolated by accomplishing procedures for left and right closures (paragraph (6) (b) 2) and 3) instead of using isolation plate (paragraph (6) (a) 1). All fuel lines downstream of capping should be purged and plugged.

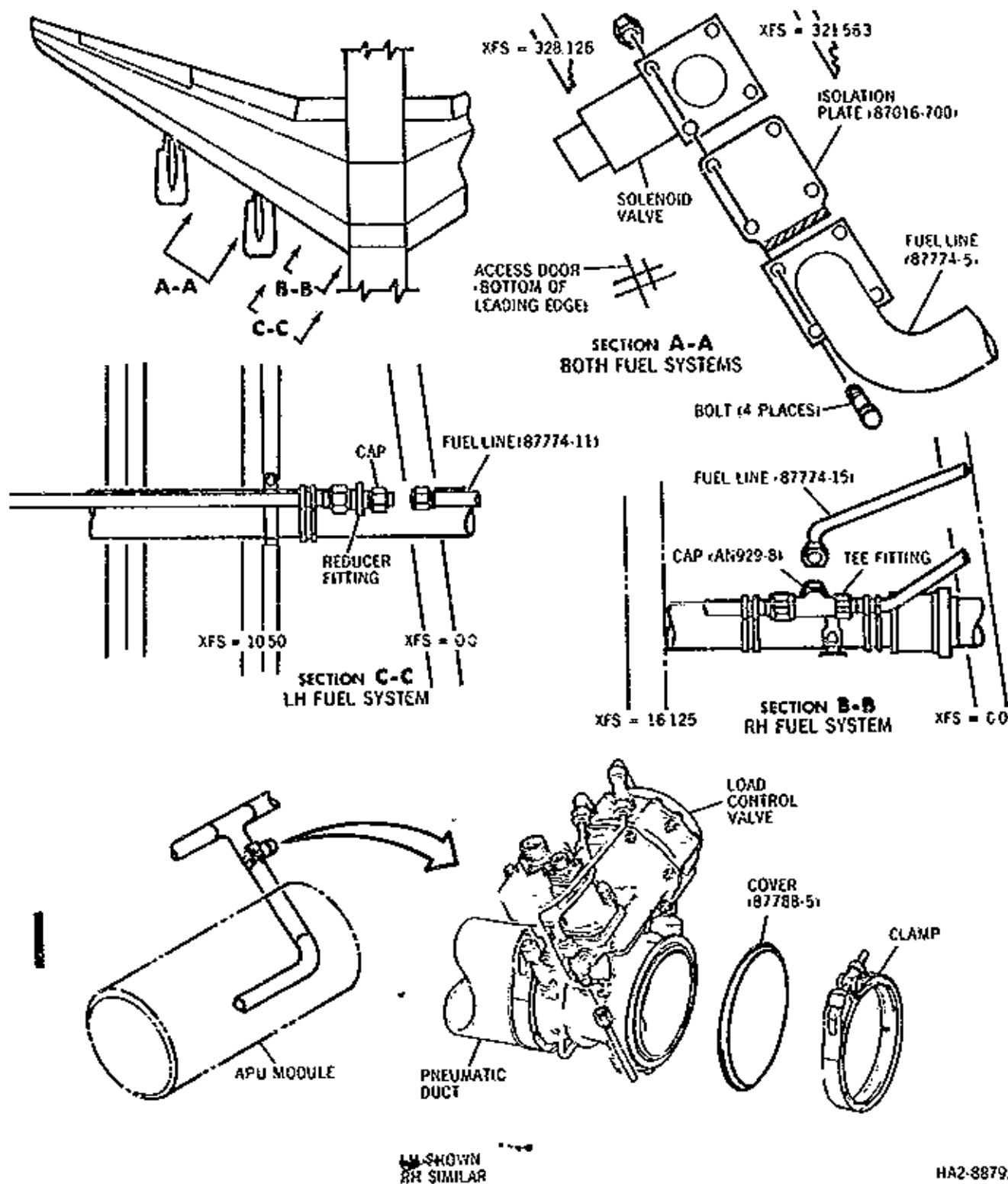
(7) Cap off bleed air, exhaust, and inlet air system ducting as follows:

- R
- (a) Bleed air system - install bleed air cover (87788-5) over open port of load control valve and secure with existing clamp.
  - (b) Exhaust system - exhaust port door is normally closed and no further action is required to seal exhaust port.
  - (c) Inlet air system - inlet plenum door, when closed, forms seal required for inlet air opening and operation of aircraft with APU removed.

(8) APU Battery

- (a) Battery need not be removed if downtime for maintenance of APU is less than one week.
- (b) If battery is removed, cap off vent and drain lines to reduce cabin air flow to atmosphere under pressurized condition.

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APU Capping Procedures  
 Figure 201

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GENERAL - SERVICING

1. General

- A. All new or overhauled engines not preserved for shipment or storage require only normal preparation for service (see paragraph 3.).
- B. All new or overhauled engines with lubrication systems filled, and subsequently drained before shipment or storage must be filled with approved oil before starting the engine.
- C. All new or overhauled engines preserved for shipment or storage must be depreserved before they are operated. The oil system must be drained and filled with approved oil and the fuel system drained and purged before starting the engine (see paragraph 4.).
- D. The following procedures are for installed APU; however, preparation for service, or depreserving may be accomplished prior to installation if 28-volt dc power is available for motoring the engine. A source of approved fuel must be available also for purging the fuel system or preservative oil.

2. Tools and Equipment Required

NOTE: Equivalent substitutes may be used instead of the following items

<u>Item</u>	<u>Name</u>	<u>Number</u>	<u>Manufacturer</u>	<u>Use</u>
A	2-gallon (7.570 liters) container			For draining oil and fuel systems
B	Lubricating oil	MIL-L-7808		For filling engine oil system
C	Lubricating oil	MIL-L-6081 (grade 1005 or 1010)		For preserving engine fuel system
D	Fuel	MIL-H-5624		For flushing depreserving oil from fuel system prior to engine installation

CAUTION: DO NOT MIX NAME BRAND OILS. ADDED OIL MUST BE  
COMPATIBLE WITH OIL IN TANK.

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3. Preparing Engine For Service

A. A newly installed engine should be prepared for service as follows:

NOTE: No depreservation is required other than normal preparation for service procedures.

(1) Fill oil tank with approved oil (see Chapter 12).

(2) Start engine and allow to accelerate to no-load governed speed (see Adjustment/Test).

NOTE: Make certain hourmeter circuit breaker is closed.

(3) Operate engine at no-load governed speed for 3 to 5 minutes.

(4) Shut down engine (see Adjustment/Test).

R (5) Remove APU housing fwd cover (see Overhaul Manual, Chapter 49-00-1).

(6) Carefully check all lubrication lines and connections for leakage.

(7) Carefully check all fuel lines and connections for leakage.

(8) Remove and replace fuel filter element and packings located in fuel control unit (see 49-30-2).

(9) Remove and replace oil filter element and packings located in oil pump housing (see 49-90-4).

(10) Bleed APU fuel system (see Paragraph 5.).

R (11) Install APU housing fwd cover (see Overhaul Manual, Chapter 49-00-1).

(12) Start engine and run for acceptability (see Adjustment/Test).

(13) Shut down engine.

R (14) Check oil level in oil tank. If oil has dropped below full mark, replenish as necessary (see Chapter 12).

CAUTION: DO NOT MIX NAME BRAND OILS. ADDED OIL MUST BE COMPATIBLE WITH OIL IN TANK.

(15) Record all pertinent information, including new engine operating time in engine log books.

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4. Depressure Engine

A. Drain and Fill Engine

- (1) Open APU control circuit breaker located on battery bus section of circuit breaker panel.
- (2) Make certain APU BATTERY switch on flight engineer's panel is in OFF position.
- R (3) Remove APU housing fwd cover and upper section (see Overhaul Manual, R Chapter 49-00-1).
- (4) Disconnect primary lead from ignition unit (see 49-40-2).
- (5) Place 2-gallon (4.570 liters) container under oil tank drain plug.
- (6) Remove drain plug and allow preservative oil to drain from tank and lines.
- (7) Install oil tank drain plug.
- (8) Fill oil tank with approved oil to full mark on sight gage (see Chapter 12).

CAUTION: DO NOT MIX NAME BRAND OILS. OIL USED FOR FLUSHING APU MUST BE COMPATIBLE WITH OIL USED IN FINAL FILLING.

- (9) Disconnect atomizer fuel inlet line and direct line into 2-gallon (4.570 liters) container.
- (10) Close APU control circuit breaker located on battery bus section of circuit breaker panel.
- (11) Pressurize APU fuel system by energizing engine fuel boost pump (see Chapter 28).
- (12) Motor engine (see Adjustment/Test).
- (13) Continue motoring until fuel is clear of preservative oil and air bubbles.

NOTE: Fuel drained should be free of air and preservative oil after three controlled motoring cycles.

- (14) When fuel is clear of preservative oil and air, stop motoring operation.
- (15) Depressurize APU fuel system by deenergizing engine fuel boost pump (see Chapter 28).

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- (16) Open APU control circuit breaker located on battery bus section of circuit breaker panel.
- (17) Remove and replace fuel filter element and packings located in fuel control unit (see 49-30-2).
- (18) Place container under oil tank, remove tank drain plug and allow oil used for flushing lubricating system to drain from tank and lines.
- (19) Remove and replace oil filter element and packings located in pump housing (see 49-40-4).
- (20) Install drain plug and fill oil tank with approved oil (see Chapter 12).
- (21) Close APU control circuit breaker located on battery bus section of circuit breaker panel.
- (22) Pressurize APU fuel system by energizing engine fuel boost pump (see Chapter 28).
- (23) Motor engine until fuel is free of air induced by fuel filter change (see paragraph 5.).
- (24) Stop motoring operation.
- (25) Depressurize APU fuel system by deenergizing engine fuel boost pump (see Chapter 28).
- (26) Open APU control circuit breaker located on battery bus section of circuit breaker panel.
- (27) Connect atomizer fuel inlet line.
- R (28) Install APU housing fwd cover and upper section (see Overhaul Manual,  
R Chapter 49-00-1).
- (29) Connect primary lead to ignition unit (see 49-40-2).
- (30) Close APU control circuit breaker located on battery bus section of circuit breaker panel.
- (31) Start engine and run for acceptability (see Adjustment/Test).
- (32) Shut down engine.
- (33) Check oil level in oil tank sight gage. If oil level has dropped below full mark, replenish as necessary (see Chapter 12).

**CAUTION:** DO NOT MIX NAME BRAND OILS. ADDED OIL MUST BE COMPATIBLE WITH OIL IN TANK.

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- (34) Record all pertinent information, including new engine operating time in engine log book.

5. Bleed APU Fuel System of Entrapped Air

A. Bleed Fuel System

NOTE: Fuel system should be bled of entrapped air after each APU fuel system component change.

- (1) Open APU control circuit breaker located on battery bus section of circuit breaker panel.
- R (2) Remove APU housing upper section (see Overhaul Manual, Chapter 49-00-1).
- (3) Make certain APU BATTERY switch on flight engineer's panel is in OFF position.
- (4) Disconnect primary lead from ignition unit (see 49-40-2).
- (5) Disconnect atomizer fuel inlet line and direct line into 2-gallon (4.570 liters) container.
- (6) Close APU control circuit breaker located on battery bus section of circuit breaker panel.
- (7) Pressurize APU fuel system by energizing engine fuel boost pump (see Chapter 28).
- (8) Motor engine (see Adjustment/Test).
- (9) Continue motoring operation until fuel is free of entrapped air.  
NOTE: Fuel drained should be free of air after three controlled motoring operations.
- (10) Depressurize APU fuel system by deenergizing engine fuel boost pump (see Chapter 28).
- (11) Open APU control circuit breaker located on battery bus section of circuit breaker panel.
- (12) Connect primary lead to ignition unit (see 49-40-2).
- (13) Connect atomizer fuel inlet line.
- R (14) Install APU housing upper section (see Overhaul Manual, Chapter 49-00-1).

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- (15) Close APU control circuit breaker located on battery bus section of circuit breaker panel.
- (16) Start engine and allow to accelerate to no-load governed speed (see Adjustment/Test).

NOTE: Make certain hourmeter circuit breaker is closed.

- (17) Shut down engine.

6. Preserve Engine in Aircraft

WARNING: DO NOT APPLY CORROSION-PREVENTIVE COMPOUNDS OR INTRODUCE HYDROCARBONS OR OIL TO COMPRESSOR SECTION OF APU. UNCONTROLLED COMBUSTION COULD RESULT.

NOTE: The procedures for motoring, starting, operation, and shutting down the APU are provided in Adjustment/Test.

A. Preserve Engine (Period of Idleness up to 180 days)

- (1) Operate engine at no-load governed speed for at least 5 minutes every 2 weeks.
- (2) Maintain correct oil level in oil tank.

CAUTION: DO NOT MIX NAME BRAND OILS.

- (3) Keep inlet door and exhaust and engine openings closed except, during engine operation.

B. Preserve Engine (Periods of Idleness from 181 to 365 days).

- (1) Operate engine for at least 5 minutes at no-load governed speed.
- (2) Shut down engine, and complete preservation of engine while engine is hot.
- R (3) Remove APU housing fwd and aft covers and upper section (see Overhaul Manual, Chapter 49-00-1).
- (4) Disconnect fuel supply line at fuel control unit. Drain, cap, and stow line.
- (5) Disconnect high pressure fuel line from fuel solenoid valve, and drain line.
- (6) Connect drain line to fuel solenoid valve connector and direct other end of drain line into 2-gallon (4.570 liters) container.



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- (7) Connect a supply of oil (MIL-L-6081), Grade 1005 or 1010) to fuel inlet fitting on fuel control unit.
- (8) Motor engine (15 to 20 seconds) or until oil flows from drain line.
- (9) Disconnect oil supply from fuel inlet fitting on fuel control unit.
- (10) Disconnect drain line from fuel solenoid valve, and connect high pressure fuel line.
- (11) Drain oil from fuel and oil systems, including oil tank.
- (12) Allow engine to stand until all oil is drained.
- (13) Remove fuel filter element and discard (see 49-30-2).
- (14) Remove oil filter element and discard (see 49-90-4).
- (15) Plug, cap or seal all open ports, fittings and lines.

**CAUTION:** DO NOT USE TAPE TO COVER FUEL SYSTEM PORTS OR CONNECTIONS.

- (16) Install APU housing upper section and fwd and aft covers (see Overhaul Manual, Chapter 49-00-1).
- (17) Tag engine as being preserved and inoperative.

**NOTE:** At the end of a one year period, the engine should be placed in service or removed and stored. If this is not feasible, contact the Garrett Corp. AiResearch Mfg. Co. of Arizona, P.O. Box 29003, AZ 85038, for further instructions.

## 7. Preserve Engine Removed From Aircraft

### A. Preserve Engine

- (1) Remove APU housing fwd cover (see Overhaul Manual, Chapter 49-00-1).
- (2) Remove cap from high pressure fuel connector at test panel, connect drain line, and direct drain line into 2-gallon (4.570 liters) container.

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- (3) Disconnect fuel supply line at fuel control unit, and connect a supply of lubricating oil.
- (4) Motor engine (15 to 20 seconds) or until clean oil flows from drain line.
- (5) Remove drain cap from oil supply line, and allow oil to drain.
- (6) Disconnect oil scavenge line at breather fitting, and allow excess oil to drain.
- (7) Drain oil from fuel pump and fuel lines.
- (8) Disconnect drain line from high pressure fuel connector at test panel, and install cap.
- (9) Connect oil scavenge line to breather fitting.
- (10) Install oil supply line drain cap.
- (11) Remove fuel filter element and discard (see 49-30-2).
- (12) Dip new filter element in lubricating oil, and install in fuel control unit.
- R (13) Install APU housing fwd cover (see Overhaul Manual, Chapter 49-00-1).
- (14) Remove APU engine module from aircraft (see 49-10-0, Removal/Installation).
- (15) Remove APU engine from module housing.
- (16) Plug, cap or seal all open ducts, lines, fittings, and electrical connectors.
- (17) Wash all excess fuel and oil from engine.
- (18) Secure tag on engine to indicate engine has been preserved.
- (19) Install engine in original shipping container (observe applicable portions of Specifications MIL-E-5595 and MIL-E-5607).

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GENERAL - ADJUSTMENT/TEST

1. General

- A. The use of suitable test equipment will permit adjustment and test of the APU while the unit is installed in the aircraft. A convenient source of 28-volt dc power is required for operating the test equipment.
- B. Adjustment of the APU is required to ensure optimum operation and to prolong the life of the unit. This adjustment/test procedure provides instructions for starting, stopping, motoring, adjusting and testing of the APU.

WARNING: PERSONNEL MUST STAND CLEAR OF APU AND TURBINE EXHAUST WHILE APU IS OPERATING.

- C. The APU inlet and exhaust areas should be cleared of personnel, foreign objects, and loose equipment.
- D. All APU overboard drains should be open and free of obstruction.
- E. Maintenance should not be performed on any APU system while APU is in operation.
- F. All systems associated with the APU should be serviced before operation.

2. Tools and Equipment Required

NOTE: Equivalent substitutes may be used instead of the following items.

<u>Item</u>	<u>Name</u>	<u>Number</u>	<u>Manufacturer</u>	<u>Use</u>
A	APU Tester	290270	AiResearch	To adjust APU
B	APU Tester Cable	294131	AiResearch	To adjust APU
C	Wheatstone Bridge	Model 4289	Leeda & Northrop	To measure resistance of thermocouple circuit
D	Pressure gage test set	282645	AiResearch	Adjust cracking pressure of acceleration limiter valve

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<u>Item</u>	<u>Name</u>	<u>Number</u>	<u>Manufacturer</u>	<u>Use</u>
E	Test Set	290417-2-1	AiResearch	To measure EGT and loading engine when calibrating pneumatic thermostat
F	Screwdriver & Wrench Assy	280353	AiResearch	To adjust fuel control governor

### 3. APU Operating Limits

**CAUTION:** APU OPERATING WITH EXHAUST GAS TEMPERATURE ABOVE CONTINUOUS OPERATION LIMITS IS EVIDENCE OF ENGINE DISTRESS. APPROPRIATE CORRECTIVE ACTION SHOULD BE TAKEN TO RESTORE NORMAL OPERATION.

A. APU should not exceed following limits during operation.

	<u>Observation</u>	<u>Condition</u>	<u>Limits</u>
	Exhaust gas temperature (EGT)	Continuous operation	620°C (1148°F) maximum (Acceptable)
		Never exceed	660°C (1220°F) maximum
R	Turbine speed	Continuous operation	41,700 rpm, maximum (100 percent)
R		Never exceed (shut down APU immediately)	45,870 maximum (110 percent)
R	Turbine speed droop	Full load	700 rpm (minimum) (1.67 percent)
R			1100 rpm (maximum) (2.63 percent)
R	Generator voltage	Maximum	400 Hz, 115 volt, 3-phase, 40 KVA
R	B. Only one air conditioning pack shall be operated when APU is used to provide air.		

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4. APU Operation

A. Prestart Checks

- (1) Make certain that air inlet and exhaust discharge areas are clear of personnel, foreign objects and loose equipment.
- (2) Close following circuit breakers.

<u>Circuit Breaker</u>	<u>Section</u>
APU CONTROL	BATTERY BUS
FIRE HORN	
APU FIRE DET	
APU EXT BOTTLE	

- (3) Check following switch positions on APU control panel.

<u>Switch</u>	<u>Position</u>
APU BATTERY	OFF
APU CRANK/O' SPD TEST	STOP
BLEED AIR	CLSD
GEN	OFF
FIRE CKT TEST	OFF
FIRE WARN AND AUDIO C/OUT	OFF
IND LTS TEST	OFF

- 4 Check following lights on APU control panel.

<u>Light</u>	<u>Indication</u>
DOORS OPEN/APU CRANK	OFF
BLEED AIR	OFF
FIRE WARN/PUSH TO EXT	OFF
AGENT LO PRESS	OFF
HI OIL TEMP/LO OIL PRESS	OFF
GEN/TRIP	OFF

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- (5) Place APU BATTERY switch in ON position and check that battery voltage reading on dc voltmeter(s) is at least 24 volts.

CAUTION: APU ENGINE START SHOULD NOT BE ATTEMPTED IF BATTERY VOLTAGE IS LESS THAN 22 VOLTS.

- (6) Place and hold IND LTS TEST switch in TEST position and verify that all APU control panel indicator lights come on. Release IND LTS TEST switch.

- R (7) Place FIRE CKT TEST switch in TEST position and release. Verify  
R following:

R (a) FIRE WARN/PUSH TO EXT light comes on.

R (b) Warning horn will sound and fire bell (in nose wheelwell) will ring.

NOTE: The PUSH TO EXT switch-lite will go out after 20 seconds. After an additional period of approximately 10 seconds, the FIRE WARN light will go off, signaling successful completion of test.

R During test, the AUDIO C/OUT switch may be used to  
R silence the warning horn and bell, if desired. The  
R FIRE WARN light will remain on.

## 5. Starting

### A. Start APU as follows:

- (1) Accomplish prestart checks (see paragraph 4.A.).

- (2) Place APU BATTERY switch in ON position.

- R (3) Place APU CRANK/O'SPD TEST switch in CRANK position.

- (4) Verify following:

(a) DOORS OPEN and APU CRANK indicating lights come on in approximately 5 seconds.

(b) APU tachometer indicates engine rotation within 10 seconds.

NOTE: APU will automatically accelerate to governed speed and EGT will be indicated on EGT gage.

(c) LO OIL PRESS light comes on and goes off at approximately 5 psig oil pressure.

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- (5) Observe and record following during acceleration and steady-state operation.
- (a) APU CRANK indicating light comes on and remains on until engine speed reaches approximately 35 percent.
  - (b) Time to reach governed speed - 60 seconds.
  - (c) EGT - do not exceed 660°C (1220°F) during starting/acceleration.
  - do not exceed 620°C (1148°F) during steady-state operation.
- (6) Allow APU to run at no-load governed speed for 1 minute.
- (7) APU is now ready to receive electrical or bleed air loads.

**B. Unsatisfactory Start**

- (1) Immediately place APU BATTERY switch in OFF position if any of following conditions occur:
- (a) APU CRANK indicating light fails to go out within 20 seconds.
  - (b) APU flame out (indicated by drop in EGT and RPM).
  - (c) EGT exceeds maximum 660°C (1220°F) during start and acceleration or maximum rated EGT 620°C (1148°F) during steady-state operation.
  - (d) Hung start (indicated when APU reaches a steady-state condition below governed speed of 95 percent and/or APU EGT increases above 660°C (1220°F)).
  - (e) RPM exceeds 103 percent for more than 10 seconds.

**NOTE:** If fire occurs during APU operation, 20-second time delay may be overridden by depressing PUSH TO EXT switch-lite to discharge extinguishing agent into APU module immediately.

- (2) If APU start is aborted, wait a minimum of 2 minutes before attempting another start.

**6. APU Shutdown**

**A. Shut down APU as follows:**

- (1) Remove all electrical and bleed air loads from APU.
- (2) Allow APU to run for 3 minutes under no-load condition (to cool down turbine).

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- (3) Momentarily place APU CRANK/O'SPD TEST switch in O'SPD TEST position.

NOTE: Placing the APU CRANK/O'SPD TEST switch in the O'SPD TEST position will simulate an overspeed condition. The fuel boost pump and fuel solenoid will be deenergized, and the APU will shutdown due to fuel starvation.

- (4) Place APU BATTERY switch in OFF position after APU has stopped rotating.

CAUTION: DO NOT PLACE APU BATTERY SWITCH IN OFF POSITION UNTIL APU HAS STOPPED ROTATING. PLACING THE BATTERY SWITCH IN OFF POSITION WILL CLOSE APU INLET DOOR AND STOP COOLING AIRFLOW THROUGH ENGINE AND APU HOUSING DURING ENGINE SPINDOWN.

NOTE: Placing the APU BATTERY switch in the OFF position after APU has stopped rotating, will close the air inlet door and isolate battery power from the APU circuit (except fire detection and suppression system which remains active). Also, the APU indicating lights will go out.

## 7. Engine Motoring

### A. Dry Motor Engine

NOTE: Engine dry motoring is accomplished when performance of maintenance checks does not require fuel flow.

- (1) Open APU control circuit breaker located on battery bus section of circuit breaker panel.
- (2) Remove APU housing module combustor cap.
- (3) Disconnect primary lead from ignition unit (see 49-40-2).

WARNING: IGNITION UNIT VOLTAGE IS SUFFICIENTLY HIGH TO ENDANGER HUMAN LIFE. APU BATTERY SWITCH MUST BE IN OFF POSITION, AND IGNITION INOPERATIVE FOR 4 MINUTES BEFORE DISCONNECTING PRIMARY LEAD FROM IGNITION UNIT. GROUND PLUG.

- (4) Disconnect fuel line from fuel atomizer, and direct fuel line into a 5-gallon container.
- (5) Close APU control circuit breaker located on battery bus section of circuit breaker panel.
- (6) Place APU BATTERY switch in ON position.
- (7) Place APU CRANK/O'SPD TEST switch in RUN position.



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- R (8) Motor engine by placing APU CRANK/O' SPD switch in CRANK position.

CAUTION: DO NOT EXCEED STARTER DUTY CYCLE OF 1 MINUTE ON,  
4 MINUTES OFF.

- (9) Terminate motoring run by placing APU BATTERY switch in OFF position.
- (10) Open APU control circuit breaker located on battery bus section of circuit breaker panel.
- (11) Connect fuel line to fuel atomizer.
- (12) Connect primary lead to ignition unit.
- (13) Install APU housing module combustor cap.
- (14) Close APU control circuit breaker located on battery bus section of circuit breaker panel.

8. Restart APU After Fire Shutdown

A. Prepare to Start

WARNING: STARTING APU BEFORE FIRE DAMAGE IS REPAIRED OR MALFUNCTION IS CORRECTED, CAN ENDANGER PERSONNEL.

NOTE: APU should not be started after a fire shutdown unless cause has been isolated and corrected, or resultant damage repaired.

- (1) Make certain APU BATTERY switch is in OFF position.
- (2) Recharge fire extinguishing agent (see Chapter 26).
- (3) Start APU (see paragraph 4.).

9. Adjustment/Test APU

A. Prepare Test Equipment For Use

- (1) Open and tag APU control circuit breaker located on battery bus section of circuit breaker panel.
- (2) Remove APU housing module fwd cover.
- (3) Disconnect engine electrical harness from receptacle located on forward left side of cargo compartment (see Figure 501).

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(4) Connect tester cable, AiResearch 294131, as follows:

- (a) Connect CABLE TO TESTER end of cable to receptacle located on tester, AiResearch 290270, control panel.
- (b) Connect ENG CONN end to plug on engine electrical harness.
- (c) Connect CUSTOMER CABLE end to receptacle located on forward left side of cargo compartment.

NOTE: Connectors on ends of tester cable are identified by marker bands.

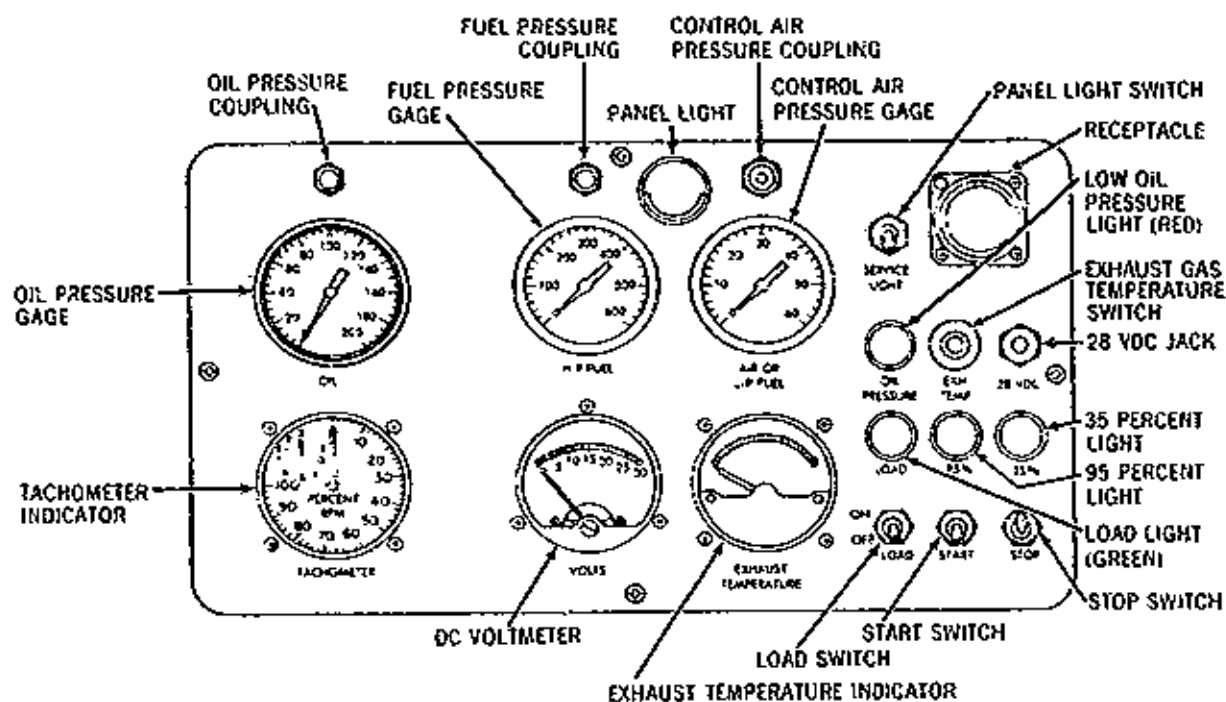
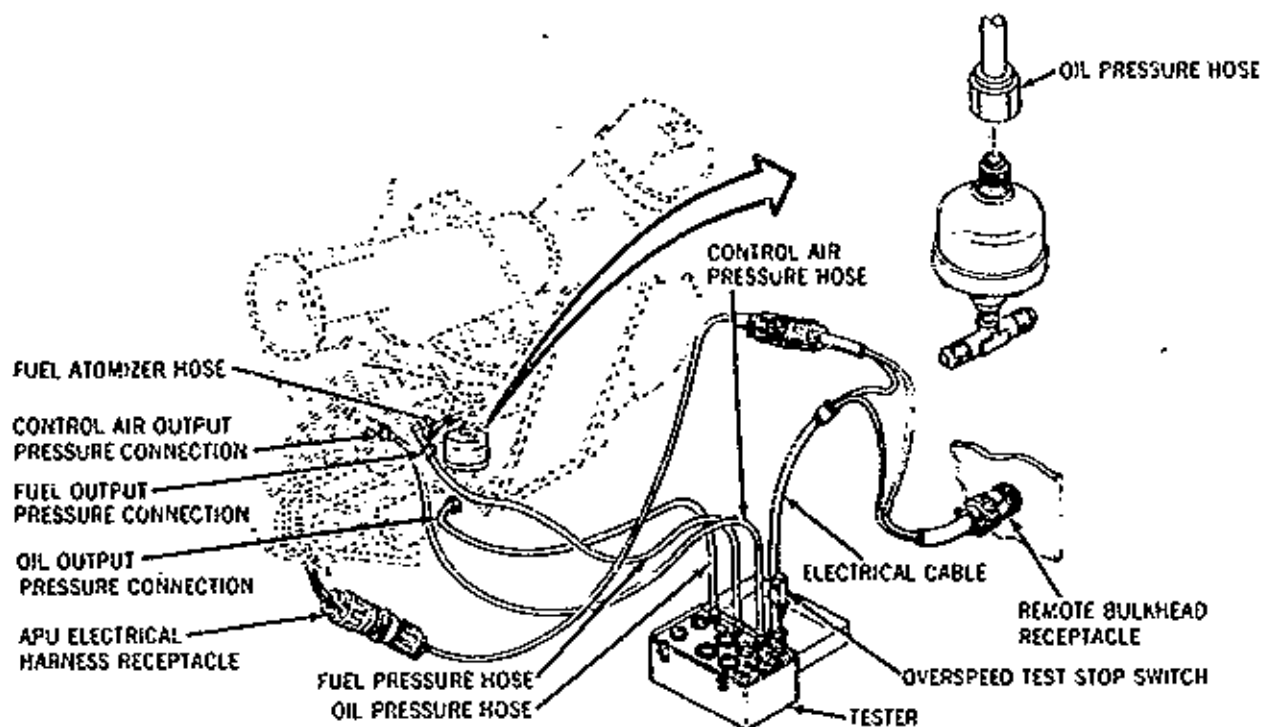
(5) Connect tester control hoses to engine as follows:

- (a) Connect one end of outlet fuel pressure test hose to tester outlet fuel pressure port and other end to outlet fuel pressure fitting at fuel control unit.
  - (b) Connect one end of control air pressure test hose to tester control air pressure port and other end to control air pressure fitting at fuel control unit.
  - (c) Connect one end of oil pressure test hose to tester oil pressure port and other end to oil pressure fitting of sequencing oil pressure switch.
- (6) Remove tag and close APU control circuit breaker located on battery bus section of circuit breaker panel.

**B. Test Exhaust Gas Temperature Loop Resistance**

- (1) Remove screws attaching tester control panel to tester, AiResearch 290270, and lift panel to gain access to temperature indicating circuit components (see Figure 501).
- (2) Tag and disconnect lead wires from terminals located at rear of exhaust gas temperature indicator case.
- (3) Connect Wheatstone Bridge, Model 4289-2, to disconnected wire leads (to measure resistance of thermocouple circuit).
- (4) Measure resistance of thermocouple circuit. Resistance should be 8.000 (+0.035) ohms.
- (5) If resistance is not within specified limit, adjust slide of variable resistor, located in tester, to obtain specified resistance.

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HA2-8765

APU Tester -- Connections  
 Figure 501

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D. Test Engine Start, Acceleration, Operation, and Actuation of Automatic Controls

NOTE: If engine does not operate satisfactorily as indicated in following procedures, shut down engine and correct malfunction before proceeding (see Trouble Shooting).

- (1) Connect tester, AiResearch 290270, to engine (see paragraph A.).
- (2) Place tester LOAD switch in OFF position.
- (3) Momentarily place tester START switch in START position.

CAUTION: DO NOT EXCEED STARTER DUTY CYCLE OF 1 MINUTE ON, 4 MINUTES OFF.

- (4) Observe following sequence of events.
  - (a) Low OIL PRESSURE light (red) and 35 percent lights come on immediately.
  - (b) Engine starts and accelerates smoothly as evidenced by:
    - 1) Oil pressure indicated on OIL PRESSURE gage.
    - 2) Engine speed indicated on TACHOMETER indicator.
    - 3) Compressor air pressure indicated on control air pressure gage.
    - 4) Fuel pressure indicated on FUEL pressure gage.
    - 5) Exhaust gas temperature indicated on EXHAUST TEMPERATURE indicator.

CAUTION: SHUT DOWN ENGINE AND CORRECT MALFUNCTION IF EXHAUST GAS TEMPERATURE EXCEEDS LIMITS SPECIFIED IN PARAGRAPH 3. DURING START, ACCELERATION AND OPERATION OF ENGINE.

- (5) When oil pressure reaches 2.5 to 3.5 psig, as indicated on oil pressure gage, fuel flow should be indicated on fuel pressure gage, verifying that fuel solenoid valve has opened.
- (6) When engine speed reaches approximately 35 percent, as displayed on tachometer indicator, 35 percent switch should actuate and open starter circuit, indicated by tester 35 percent light going off.
- (7) When engine speed reaches 95 percent, as displayed on tachometer indicator, 95 percent switch should actuate to open ignition circuit and close hourmeter (time totalizing meter) circuit. This is indicated by 95 percent light coming on and hourmeter starting to record engine operating time.

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- (8) Engine should continue to accelerate, and fuel governor, located in fuel control unit, should control engine speed at no-load governed speed, 101.25 percent (41,700 rpm) maximum, as displayed on tester tachometer indicator.

**NOTE:** Indication of 100 percent speed on tester tachometer indicator is equivalent to 41,185 rpm turbine wheel speed.

- (9) Using tester overspeed test stop switch, energize pneumatic shutoff solenoid to shut down engine. Solenoid should open to pressurize centrifugal switch and actuate centrifugal switch overspeed switch.

- (10) Remove tester and cable.

**E. Check and Adjust Fuel Control Unit Governor Speed Setting**

- (1) Connect tester, AiResearch 290270, to engine (see paragraph A.).
- (2) Place Tester LOAD switch in OFF position.
- (3) Momentarily place tester START switch in START position and allow engine to accelerate to no-load governed speed.

**CAUTION:** DO NOT EXCEED STARTER DUTY CYCLE OF 1 MINUTE ON, 4 MINUTES OFF.

**NOTE:** Indication of 100 percent engine speed on tester tachometer indicator is equivalent to 41,185 rpm turbine wheel speed.

- (4) With no load applied, check steady-state, no-load governed speed indicated on tester tachometer indicator.
- (5) If steady-state, no-load governed speed is not within limits of 100.25 to 101.75 percent (41,500 to 41,700 rpm) indicated on tester tachometer indicator, adjust fuel governor as follows:
- (a) Use screwdriver and wrench, AiResearch 280253, to facilitate adjustment.
  - (b) To increase governor speed, loosen locknut and turn adjustment screw clockwise; to decrease speed, turn adjustment screw counterclockwise.
  - (c) When adjustment is satisfactory, tighten locknut, and safety with .032 corrosion-resistant steel lockwire.
- (6) Remove tester and cable.

- R (7) Install APU housing fwd cover (see Overhaul Manual, Chapter 49-00-1).

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POWER PLANT - MAINTENANCE PRACTICES

1. General

- A. This maintenance practice provides removal/installation procedures for the APU power plant module which contains the APU engine with engine accessories, ac generator, necessary wiring and control components.
- B. Removal/installation procedures are applicable to second APU module, if dual APU system is installed.
- C. The cargo compartment overhead monorail system provides means to transport the APU module to and from the cargo compartment door opening.
- D. The rail, carriage and hoist are all ground support equipment.

2. Tool and Equipment Required

	<u>Item</u>	<u>Name</u>	<u>Number</u>	<u>Manufacturer</u>	<u>Use</u>
R	A	Rail	88190-3(LH) 88191-3(RH)	Ace Clearwater	Support for module removal/installation
	B	Hoist	87020-5		To transport APU module to and from cargo compartment door
	C	Carriage	87192		
	D	Transportation Dolly			To mount and transport APU module to and from aircraft

3. Removal/Installation APU Power Plant Module

A. Remove APU Module

- (1) Open and tag following circuit breakers.

Circuit Breaker

APU CONTROL

FIRE HORN

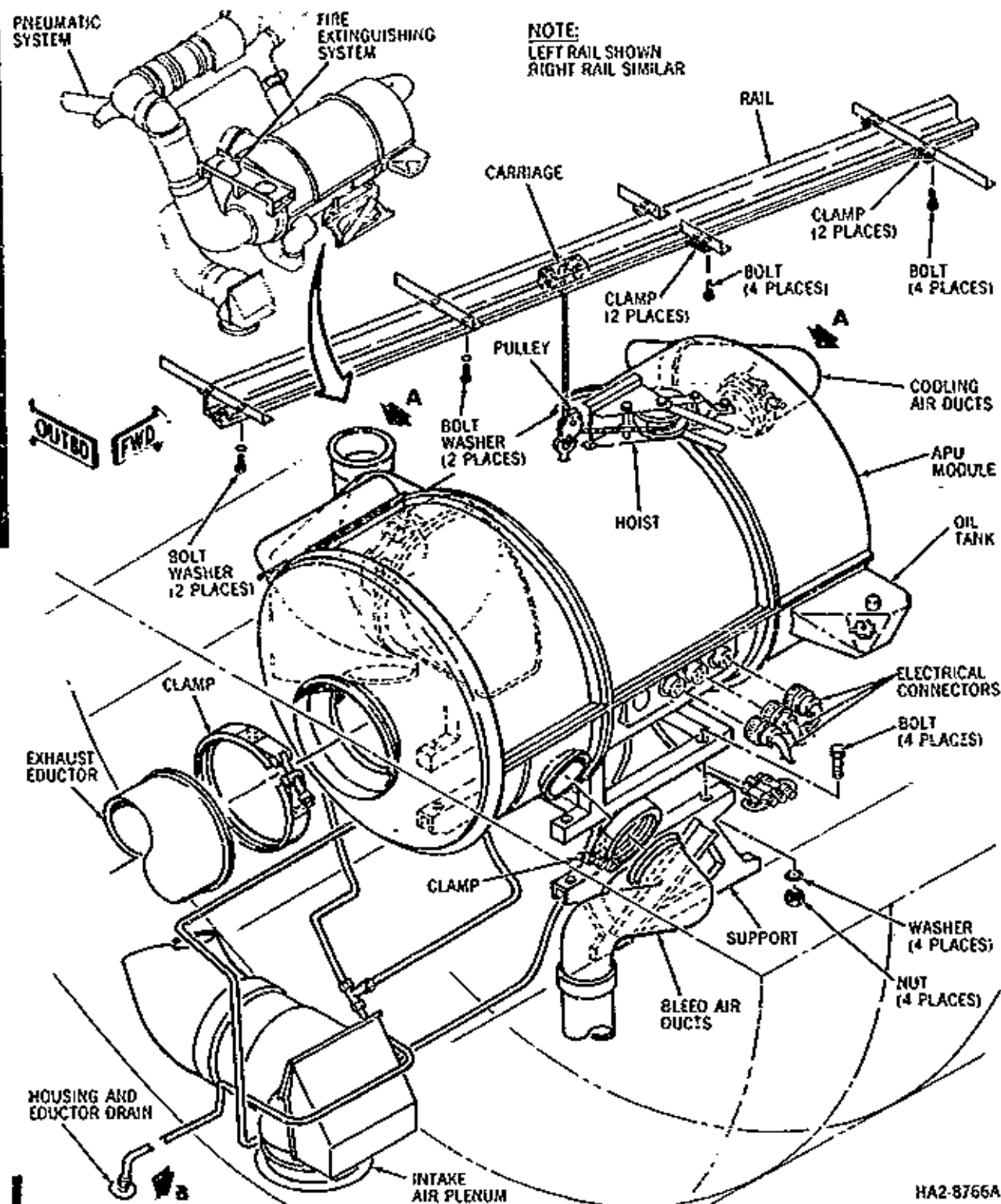
APU FIRE DET

APU EXT BOTTLE

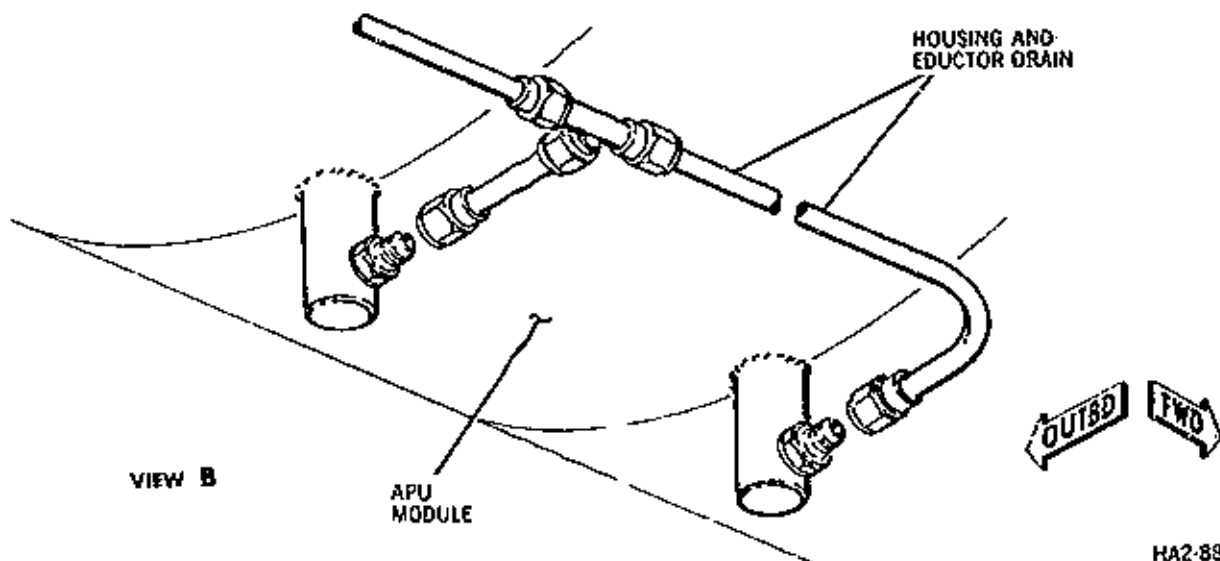
Section

BATTERY BUS

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 MAINTENANCE MANUAL



APU Module -- Removal/Installation  
 Figure 201 (Sheet 1)

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203



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- (2) Remove module cooling air ducts (See 49-50-4).
- (3) Remove APU engine air inlet fwd and aft elbow ducts (See 49-50-5).
- (4) Remove exhaust elbow duct and eductor (See 49-80-1).
- (5) Remove bleed air ducts and load control valve (See 49-50-1 and 49-50-2).
- (6) Disconnect following electrical connectors from lower section of APU housing module.
  - (a) Generator output and starter
  - (b) APU control
  - (c) Generator control
- (7) Disconnect following lines from APU housing module.
  - (a) Vent from oil tank
  - (b) Vent to oil tank
  - (c) Oil to tank
  - (d) Oil to engine
  - (e) Fuel inlet
  - (f) Load control valve pressure
  - (g) Fire extinguisher
  - R (h) Deleted
  - (i) APU housing module drain
- (8) Disconnect oil temperature switch electrical connector.
- (9) Remove oil tank and oil lines as a unit (See 49-90-1).
- R (10) Install APU overhead (removal/installation) rail.
- R (10a) Install carriage in overhead rail.
- R (10b) Attach hoist to APU module housing upper section.
- R (11) Connect hoist pulley to APU module housing lifting eye.
- R (11a) Route hoist cable around pulley and attach end to carriage.

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- (12) Operate hoist and take up slack on cable.

**CAUTION:** HOIST SHOULD BE RAISED JUST ENOUGH TO KEEP CABLE TAUT.  
EXCESSIVE TENSION ON CABLE WILL IMPOSE PRELOAD ON MODULE  
ATTACHING BOLTS.

- (13) Remove APU module attaching bolts.

- (14) Carefully raise APU module, while manually guiding, to clear ducts,  
lines and electrical wiring.

- (15) Move APU module to cargo compartment door opening.

- (16) Lower APU module unto transportation dolly.

- R (17) Disconnect hoist cable from carriage.

- R (18) Remove hoist pulley from APU module housing lifting eye.

- R (19) Remove hoist from APU module housing upper section.

- R (20) Remove APU overhead (removal/installation) rail.

**NOTE:** If APU module is not to be replaced immediately, disconnected  
electrical, plumbing and duct connections should be covered,  
capped or plugged.

**B. Install APU Module**

- (1) Make certain following circuit breakers are open and tagged.

Circuit Breaker

Section

APU CONTROL

BATTERY BUS

- R FIRE HORN

APU FIRE DET

APU FIRE BOTTLE

- R (2) Position APU module at cargo compartment door opening and attach hoist  
R to module upper section.

- R (2a) Connect hoist pulley to APU module housing lifting eye.

- R (2b) Route hoist cable around pulley and attach end to carriage in overhead  
R rail.

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- (3) Remove all protective covers, caps and plugs from APU module and aircraft connections.
- (4) Move APU module, while manually guiding towards mounting position.
- (5) Carefully lower APU module into mounting position making certain module clears all lines, ducts and electrical wiring.
- (6) Install APU module attaching bolts.
- R (7) Disconnect hoist cable from carriage.
- R (7a) Remove hoist pulley and hoist from APU module housing.
- R (7b) Remove APU overhead (removal/installation) rail.
- (8) Install bleed air ducts (See 49-50-2).
- (9) Install exhaust elbow duct and eductor (See 49-80-1).
- (10) Install APU engine air inlet fwd and aft elbow ducts (See 49-50-5).
- (11) Install module cooling air ducts (See 49-50-4).
- (12) Install oil tank and oil lines (See 49-90-1).
- (13) Connect following lines to APU module.
  - (a) Vent from oil tank
  - (b) Vent to oil tank
  - (c) Oil to tank
  - (d) Oil to engine
  - (e) Fuel inlet
  - (f) Load control valve pressure
  - (g) Fire extinguisher
  - R (h) Deleted
  - (i) APU housing module drain
- (14) Connect following electrical connectors to APU module.
  - (a) Generator output and starter

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(b) APU control

(c) Generator control

(15) Connect oil temperature switch electrical connector.

(16) Remove tag close following circuit breakers.

Circuit Breaker

Section

APU CONTROL

BATTERY BUS

FIRE HORN

APU FIRE DET

APU EXT BOTTLE

4. Adjustment/Test APU

4. Test APU

(1) Service APU oil system (See Chapter 12).

(2) Start APU and check operation in accordance with 49-00, Adjustment/Test.

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COMBUSTOR UNIT - MAINTENANCE PRACTICES

1. General

- A. The combustor unit is clamp-mounted to the APU turbine plenum. Access to the unit is through the APU engine housing fwd cover.

WARNING: MAKE CERTAIN APU HAS COOLED SUFFICIENTLY AFTER SHUTDOWN TO PERMIT SKIN CONTACT. MAKE CERTAIN APU BATTERY SWITCH IN FLIGHT COMPARTMENT IS IN OFF POSITION.

2. Removal/Installation Combustor Unit

A. Remove Combustor Unit

- (1) Open and tag APU control circuit breaker located on battery bus section of circuit breaker panel.
- (2) Remove APU engine housing fwd cover (see Overhaul Manual, Chapter 49-00-1).
- (3) Disconnect igniter plug lead from igniter plug.

WARNING: IGNITER COIL UNIT VOLTAGE IS SUFFICIENTLY HIGH TO ENDANGER HUMAN LIFE. APU BATTERY SWITCH MUST BE IN OFF POSITION AND IGNITION INOPERATIVE FOR AT LEAST 4 MINUTES BEFORE DISCONNECTING IGNITER PLUG LEAD, GROUND PLUG.

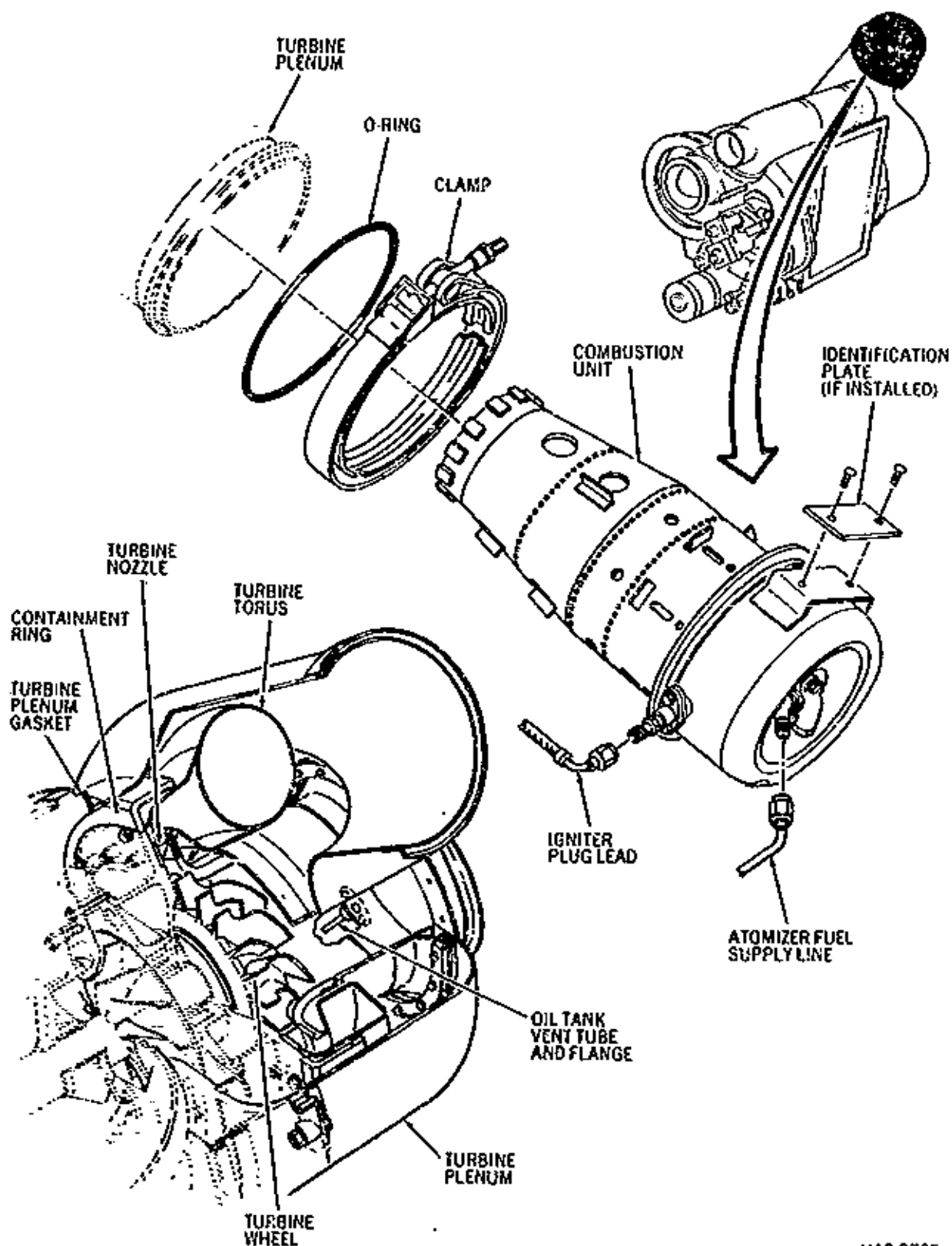
- (4) If applicable, remove identification plate.

NOTE: If identification plate is not damaged, retain plate for installation on replacement combustor unit. If identification plate is damaged, carefully note all information for transfer to new identification plate.

- (5) Disconnect fuel atomizer supply line.
- (6) Loosen combustor unit mounting clamp, and remove unit from APU turbine plenum. Remove and discard O-ring.

NOTE: Combustor unit (combustion liner portion) should be checked for cracks, corrosion, buckling, and hot spots. If liner damage is indicated, a closer examination of engine hot section components should be performed to ensure that damage is limited to the liner.

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HA2-8785

Combustor Unit -- Removal/Installation  
 Figure 201

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- (2) Check turbine gasket for evidence of deterioration or leakage. If deterioration or leakage is indicated, remove engine and ship to overhaul facility for detailed inspection.
- (3) Visually check turbine plenum for cracks in welds and adjoining material. If cracks are found, remove engine and ship to overhaul facility for detailed inspection.
- (4) Visually check turbine nozzle, turbine torus, and turbine/exducer wheel for obvious distress. If serious distress (cracks, worn areas, deformation, and eroded areas) is observed, remove engine and ship to overhaul facility for detailed inspection.
- (5) Check that oil tank vent tube and opening in turbine flange are not obstructed. Clean if required.

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ENGINE FUEL AND CONTROL - TROUBLE SHOOTING

1. General

- A. Trouble shooting procedures for the APU fuel system are outlined on Figure 101, sheets 1 through 4.
- B. Operators using AiResearch Tester No. 290270-2-1, should refer to 49-00, Adjustment/Test.

2. Tools and Equipment Required

NOTE: Equivalent substitutes may be used instead of the following items.

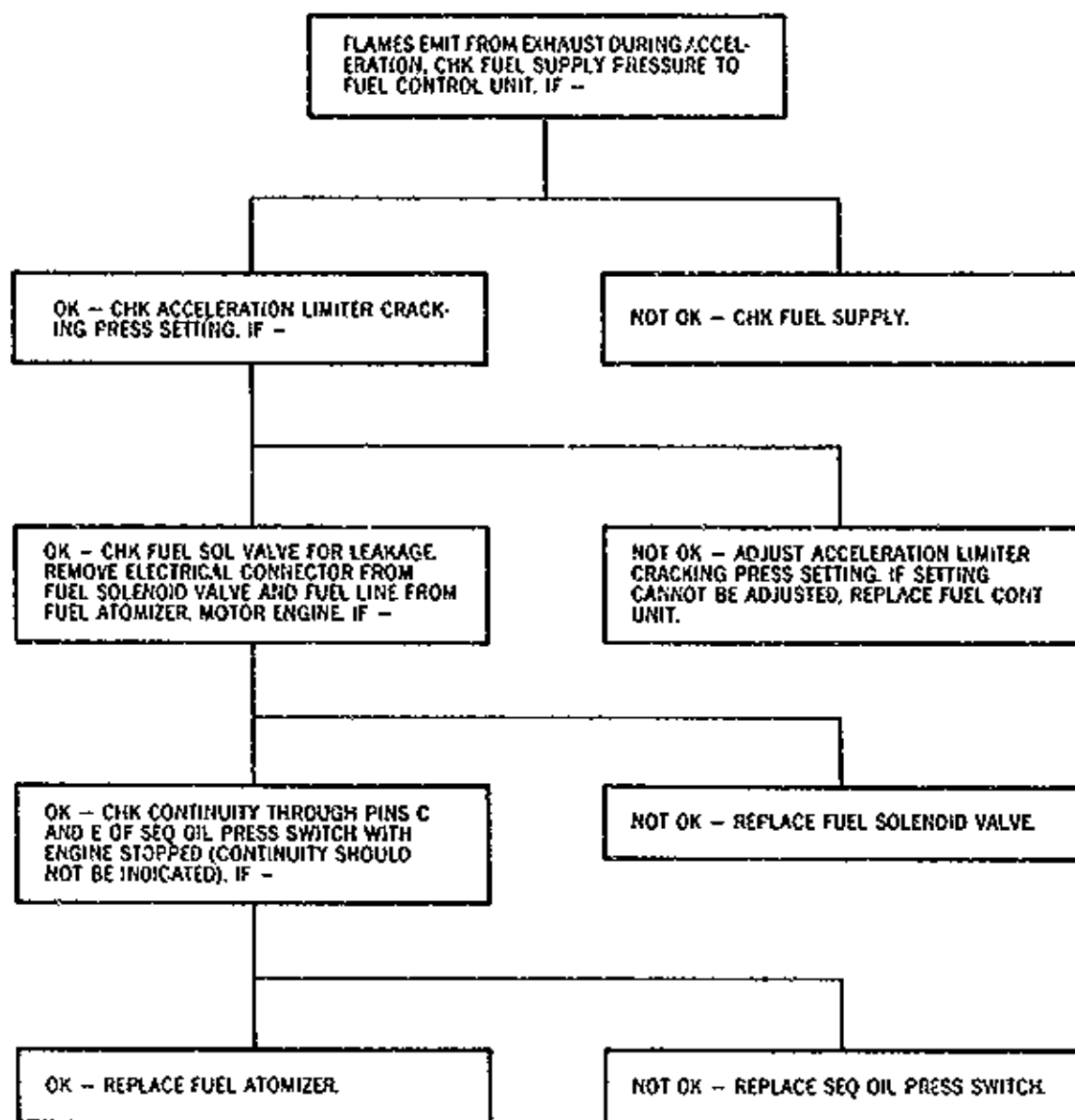
<u>Item</u>	<u>Name</u>	<u>Number</u>	<u>Manufacturer</u>	<u>Use</u>
A	APU Tester	290270-2-1	AiResearch	For trouble shooting APU
B	APU Tester cable	294131-1-1	AiResearch	For trouble shooting APU

3. Trouble Shooting APU Fuel System

- A. For trouble shooting procedure, refer to Figure 101 and use applicable sheet.

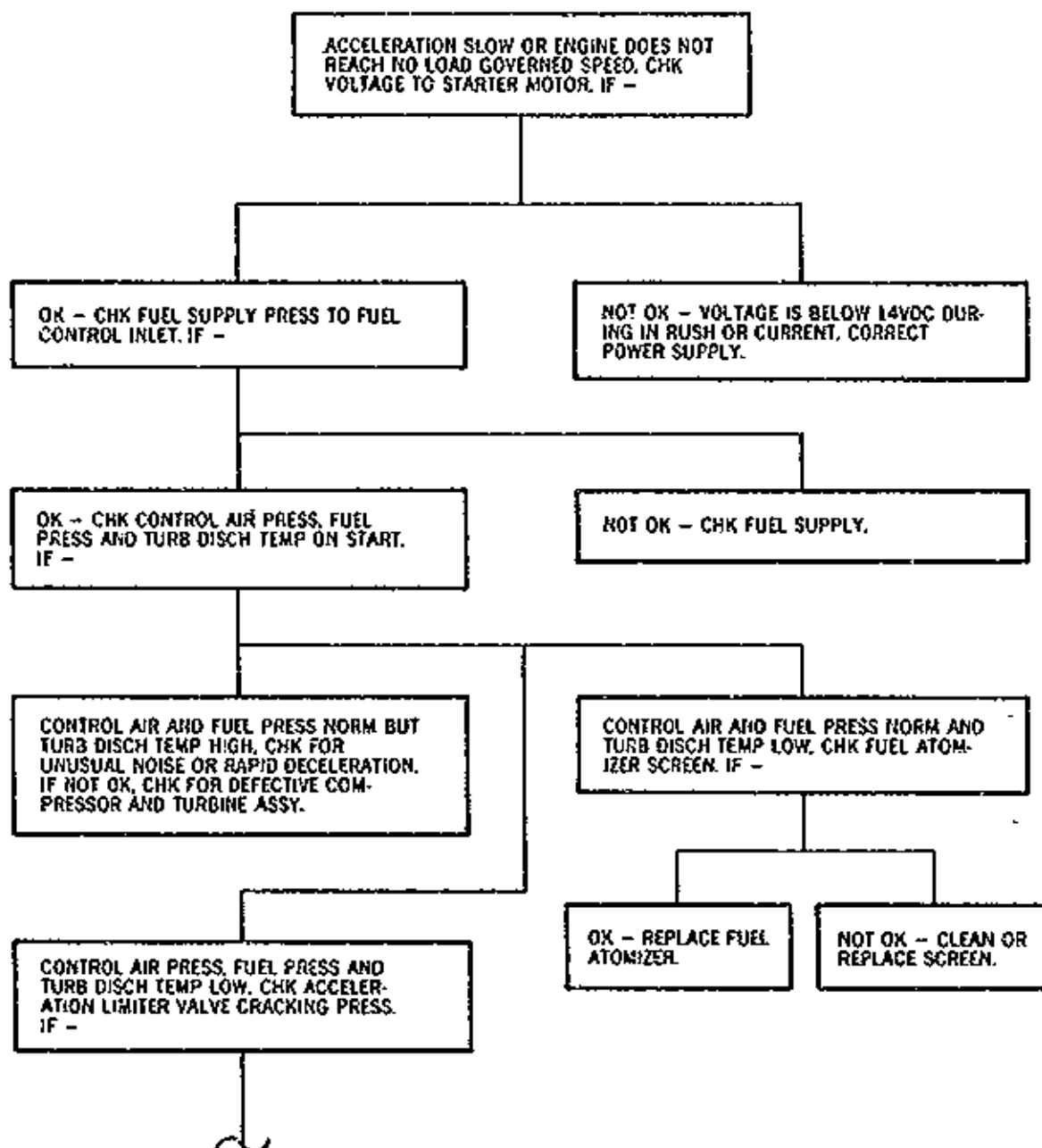


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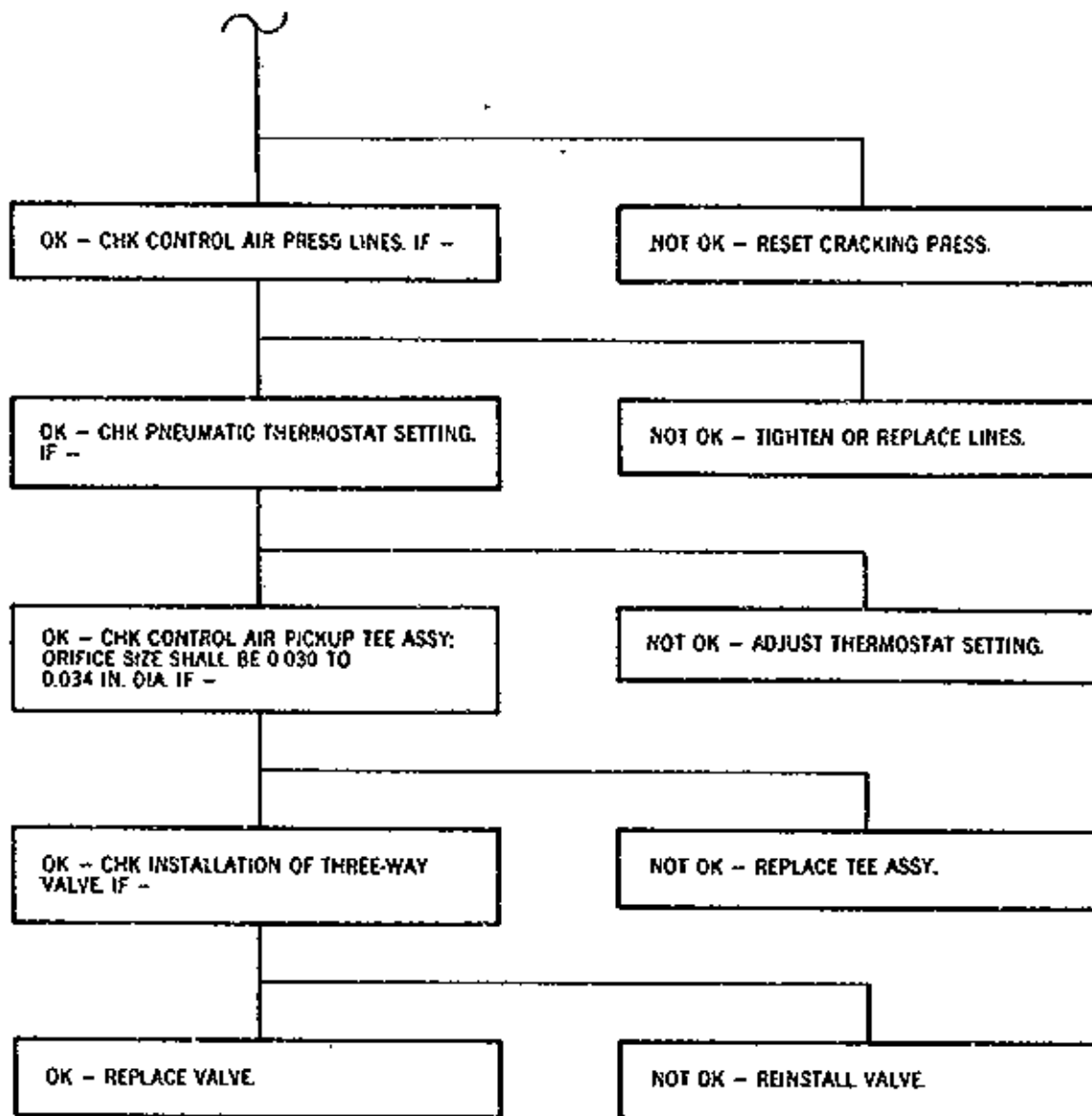
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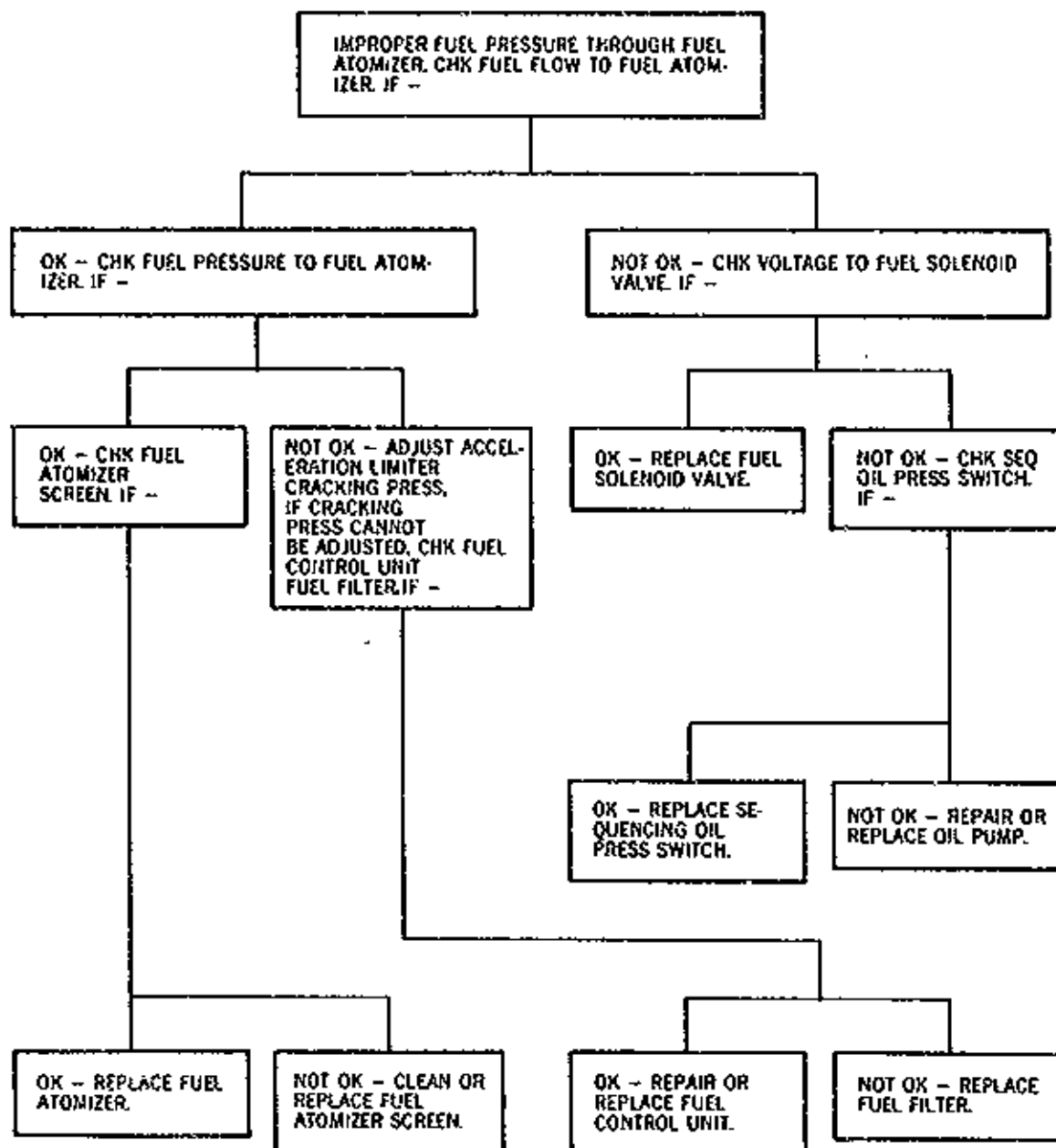
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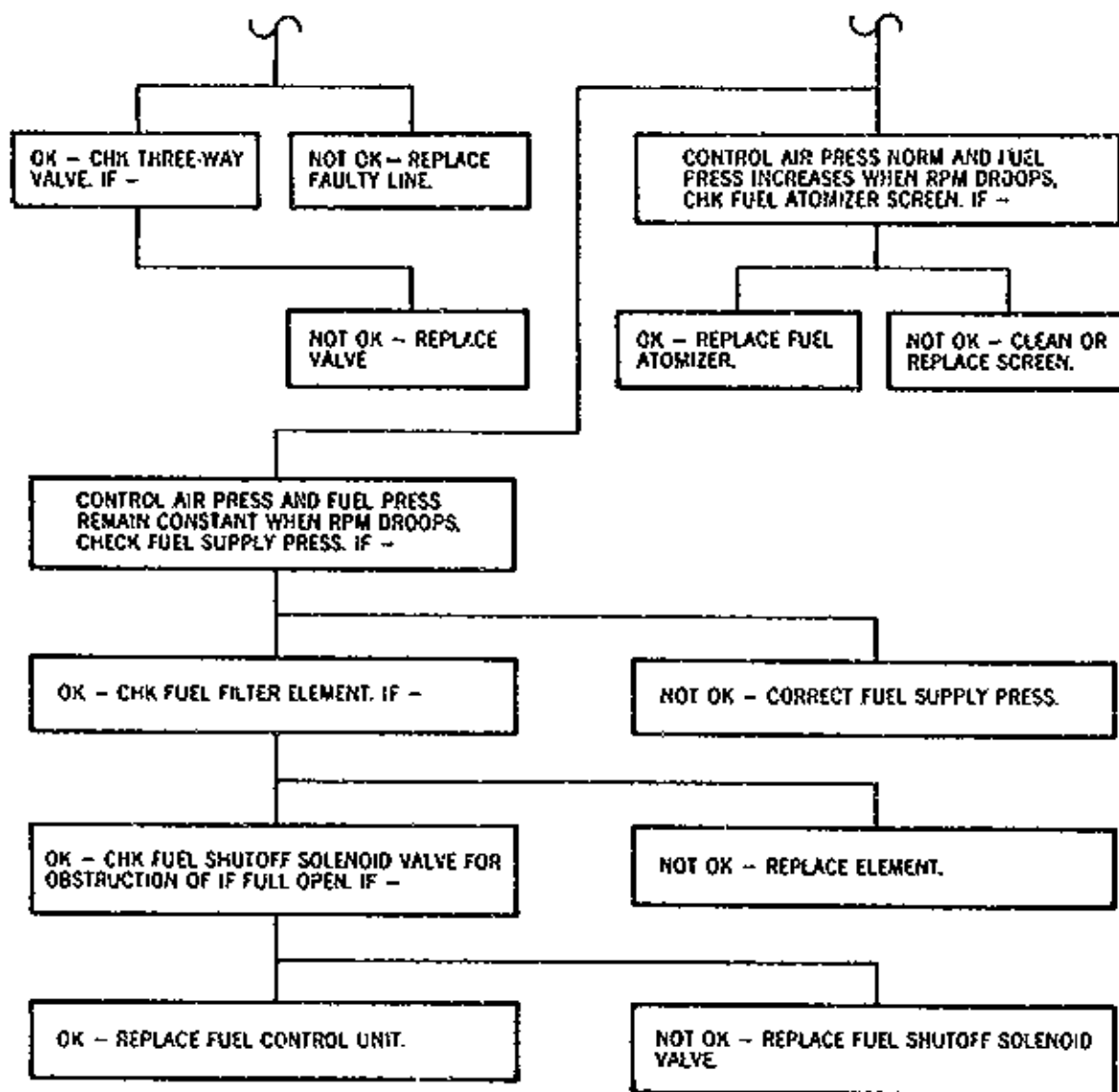
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HA2-8770

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HA2-8802

Engine Fuel and Control - Trouble Shooting  
 Figure 101 (Sheet 6)

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MAINTENANCE MANUAL

FUEL CONTROL UNIT - MAINTENANCE PRACTICES

1. General

- A. The fuel control unit consists of a fuel pump, filter, solenoid valve, governor, and acceleration limiter valve. The control unit is mounted on the forward face of the engine accessory drive case. Access to the control unit is through the fwd cover of the APU engine housing.

WARNING: MAKE CERTAIN APU HAS COOLED SUFFICIENTLY AFTER SHUTDOWN TO PERMIT SKIN CONTACT. MAKE CERTAIN APU BATTERY SWITCH IN FLIGHT COMPARTMENT IS IN OFF POSITION.

2. Tools and Equipment Required

NOTE: Equivalent substitutes may be used instead of the following item.

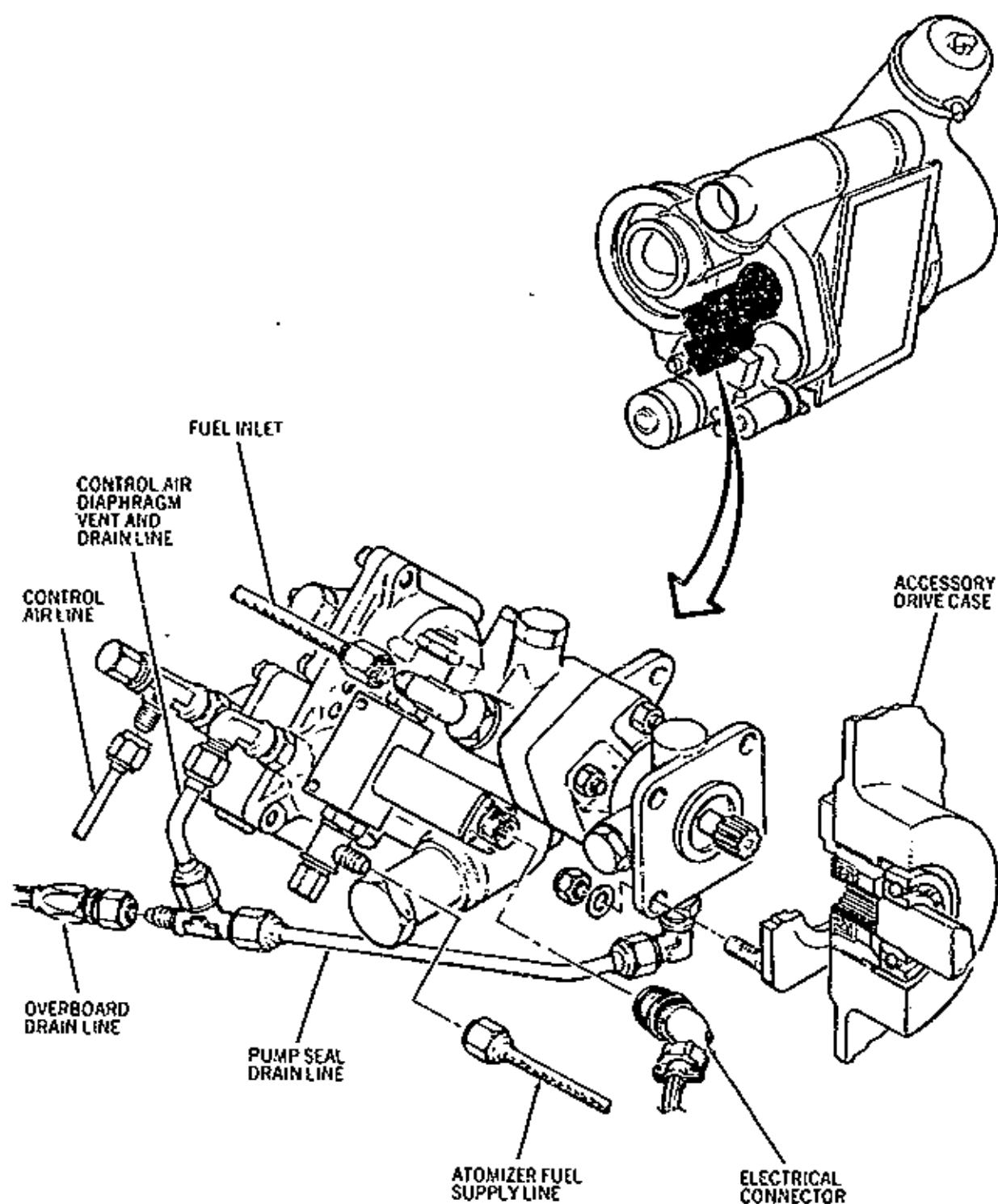
<u>Item</u>	<u>Name</u>	<u>Number</u>	<u>Manufacturer</u>	<u>Use</u>
A	Grease (Mil-G-21164	Mobil 29 or Royco 130	Mobil Chemical Co. Royal Lubricants Co.	Lubricate fuel control unit drive shaft splines

3. Removal/Installation Fuel Control Unit

- A. Remove Fuel Control Unit (See Figure 201)

- (1) Open and tag APU control circuit breaker located on battery bus section of circuit breaker panel.
- (2) Remove APU engine housing fwd cover (see Overhaul Manual, Chapter 49-00-1).
- (3) Disconnect overboard drain line.
- (4) Disconnect control air line.
- (5) Disconnect fuel inlet line.
- (6) Disconnect atomizer fuel supply line.
- (7) Remove fuel control unit attaching nuts and washers.
- (8) Carefully withdraw fuel control unit splined shaft from mating splines in accessory drive case.

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Fuel Control Unit -- Removal/Installation  
Figure 201

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MAINTENANCE MANUAL

- (9) Pull fuel control unit out sufficiently to gain access to fuel solenoid valve electrical connector; disconnect connector and remove fuel control unit.

**B. Install Fuel Control Unit**

NOTE: Prior to installation of fuel control unit, ensure that acceleration limiter valve orifice drain hole is not plugged.

- (1) Make certain APU control circuit breaker located on battery bus section of circuit breaker panel is open and tagged.
- (2) Lightly lubricate accessory drive shaft flats and splined teeth of fuel control unit with grease (MIL-G-21164, Mobil 29 or Royco 13D).
- (3) Connect fuel solenoid valve electrical connector and safety to fuel filter cap with lockwire.
- (4) Position fuel control unit and engage splined shaft with mating spline of accessory drive shaft.
- (5) Install fuel control unit attaching nuts and washers. Tighten nuts to torque of 70 to 90 inch-pounds.
- (6) Connect atomizer fuel supply line.
- (7) Connect fuel inlet line.
- (8) Connect control air line.
- (9) Connect overboard drain line.
- (10) Bleed APU fuel system (see 49-00, Adjustment/Test).
- (11) Remove tag and close APU control circuit breaker located on battery bus section of circuit breaker panel.
- (12) To perform functional test or make necessary adjustments to fuel control unit, see 49-00, Adjustment/Test.
- R (13) Install APU engine housing fwd cover (see Overhaul Manual, Chapter  
R 49-00-1).



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FUEL CONTROL UNIT FILTER - MAINTENANCE PRACTICES

1. General

- A. The fuel control unit filter is contained within the filter housing of the pump section of the fuel control unit. Access to the filter is through the APU engine housing fwd cover.

**WARNING:** MAKE CERTAIN APU HAS COOLED SUFFICIENTLY AFTER SHUTDOWN TO PERMIT SKIN CONTACT. MAKE CERTAIN APU BATTERY SWITCH IN FLIGHT COMPARTMENT IS IN OFF POSITION.

2. Tools and Equipment Required

**NOTE:** Equivalent substitutes may be used instead of the following item.

<u>Item</u>	<u>Name</u>	<u>Number</u>	<u>Manufacturer</u>	<u>Use</u>
A	Fuel	MIL-T-5624, Grade JP-4 or JP-5	Commercially available	To lubricate filter O-rings

3. Removal/Installation Fuel Control Unit Filter

A. Remove Filter Element (See Figure 201)

- (1) Shut off fuel supply to fuel control unit.
- (2) Open and tag APU control circuit breaker located on battery bus section of circuit breaker panel.
- R (3) Remove APU engine housing fwd cover (see Overhaul Manual, Chapter  
R 49-00-1).
- (4) Remove filter cap.
- (5) Remove filter element, and O-rings and discard.

B. Install Filter Element

- (1) Make certain APU control circuit breaker located on battery bus section of circuit breaker panel is open and tagged.
- (2) Lightly lubricate new O-rings with fuel (MIL-T-5426, Grade JP-4 or JP-5).
- (3) Install new filter element and new packings in filter housing.

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- (4) Install filter cap and screw until cap bottoms out. Tighten cap to torque of 100 to 120 inch-pounds.
- (5) Safety filter cap to fuel solenoid valve electrical connector with lockwire.
- (6) Bleed APU fuel system (see 49-00).
- R (7) Install APU engine housing fwd cover (see Overhaul Manual, Chapter  
R 49-00-1).
- (8) Remove tag and close APU control circuit breaker located on battery bus section of circuit breaker panel.

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FUEL SOLENOID VALVE - MAINTENANCE PRACTICES

1. General

- A. The APU fuel solenoid valve is mounted on the fuel pump housing of the fuel control unit. Access to the fuel solenoid valve is through the APU engine housing fwd cover.

WARNING: MAKE CERTAIN APU HAS COOLED SUFFICIENTLY AFTER SHUTDOWN TO PERMIT SKIN CONTACT. MAKE CERTAIN APU BATTERY SWITCH IN FLIGHT COMPARTMENT IS IN OFF POSITION.

2. Tools and Equipment Required

NOTE: Equivalent substitutes may be used instead of the following item.

<u>Item</u>	<u>Name</u>	<u>Number</u>	<u>Manufacturer</u>	<u>Use</u>
A	Fuel	MIL-I-5624, Grade JP-4 or JP-5	Commercially available	To lubricate fuel solenoid valve O-rings

3. Removal/Installation Fuel Solenoid Valve

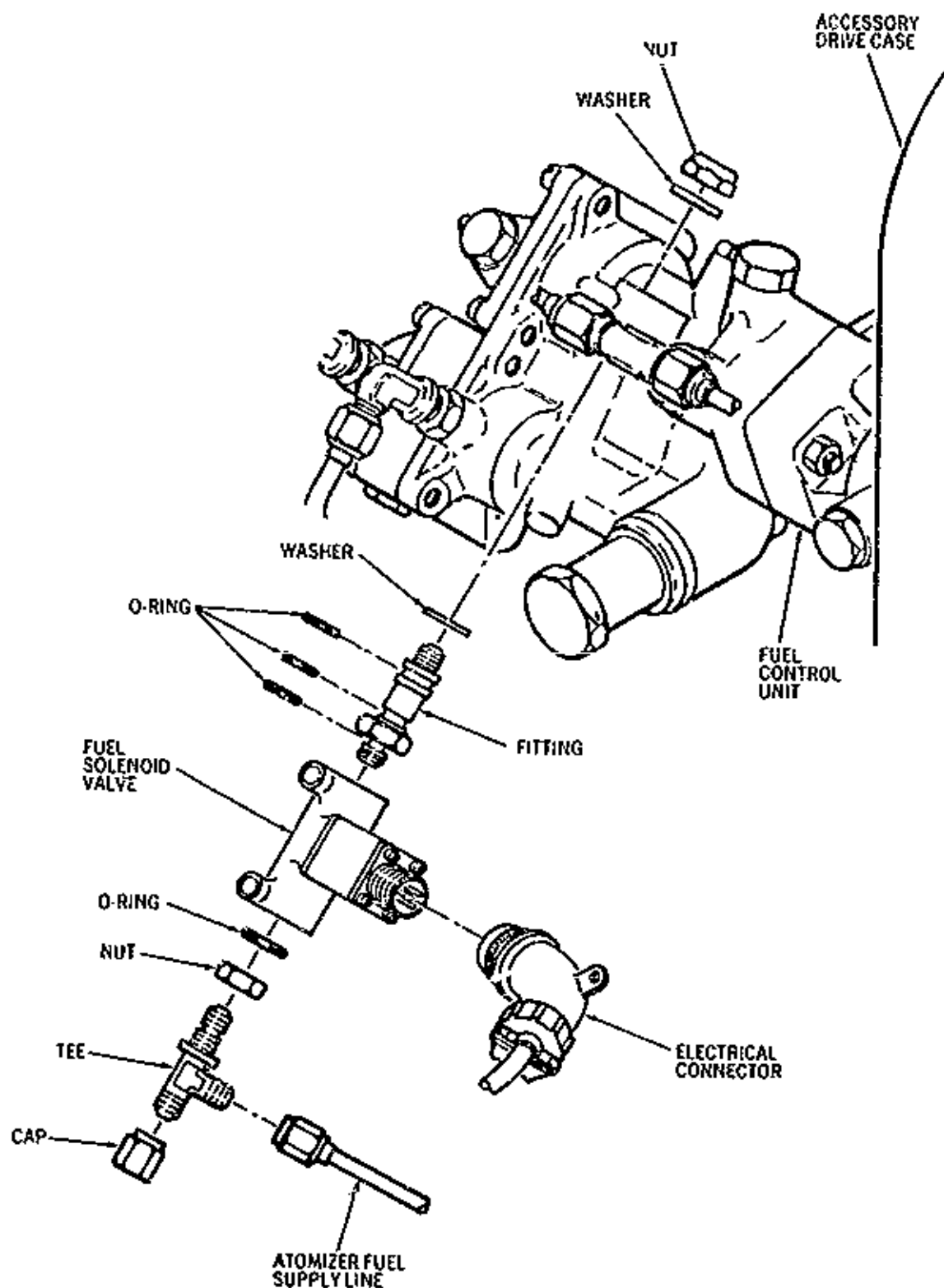
A. Remove Valve (See Figure 201)

- (1) Shut off fuel supply to fuel control unit.
- (2) Oper and tag APU control circuit breaker located on battery bus section of circuit breaker panel.
- R (3) Remove APU engine housing fwd cover (see Overhaul Manual, Chapter  
R 49-00-1).
- (4) Disconnect atomizer fuel supply line from tee.

NOTE: A suitable container is required to catch small amount of fuel remaining in line or valve.

- (5) Remove fuel solenoid valve retaining nut and washer.
- (6) Remove fuel solenoid valve.
- (7) Remove O-rings and washer from fuel solenoid valve fitting. Discard O-rings.
- (8) Remove tee from fuel solenoid valve. Discard O-ring.

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Fuel Solenoid Valve -- Removal/Installation  
Figure 201

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**B. Install Valve**

- (1) Make certain APU control circuit breaker located on battery bus section of circuit breaker panel is open and tagged.
- (2) Lightly coat new O-rings with fuel (MIL-I-5624, Grade JP-4 or JP-5).
- (3) Install new O-rings and washer on fuel solenoid valve fitting.
- (4) Install fitting on fuel solenoid valve.
- (5) Install fuel solenoid valve on fuel pump housing.
- (6) Install fuel solenoid valve retaining washer and nut. Tighten nut to torque of 100 to 110 inch-pounds.
- (7) Install new O-ring on tee, and install tee on fuel solenoid valve.
- (8) Connect atomizer fuel supply line to tee.
- (9) Bleed APU fuel system (see 49-00, Adjustment/Test).
- (10) Connect fuel solenoid valve electrical connector. Safety connector to fuel filter cap with lockwire.
- R (11) Install APU engine housing fwd cover (see Overhaul Manual, Chapter  
R 49-00-1).
- (12) Remove tag and close APU control circuit breaker located on battery section of circuit breaker panel.

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FUEL ATOMIZER - MAINTENANCE PRACTICES

1. General

- A. The fuel atomizer is mounted on the combustion chamber cap. Access to the atomizer is through the APU engine housing combustor cap.

**WARNING:** MAKE CERTAIN APU HAS COOLED SUFFICIENTLY AFTER SHUTDOWN TO PERMIT SKIN CONTACT. MAKE CERTAIN APU BATTERY SWITCH IN FLIGHT COMPARTMENT IS IN OFF POSITION.

2. Tools and Equipment Required

**NOTE:** Equivalent substitutes may be used instead of the following items.

<u>Item</u>	<u>Name</u>	<u>Number</u>	<u>Manufacturer</u>	<u>Use</u>
A	Container			To catch residual fuel from disconnected fuel line
B	Compound	C-5A	Fel Products Mfg. Co.	To coat fuel atomizer attach bolt threads
C	Torque Wrench	0 - 100 inch-pounds		To tighten fuel atomizer attach bolts to proper torque

3. Removal/Installation Fuel Atomizer

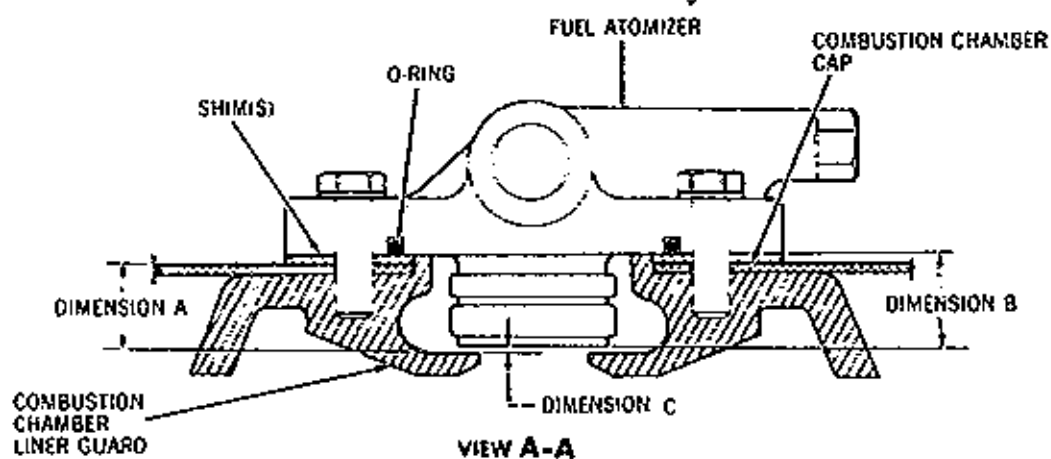
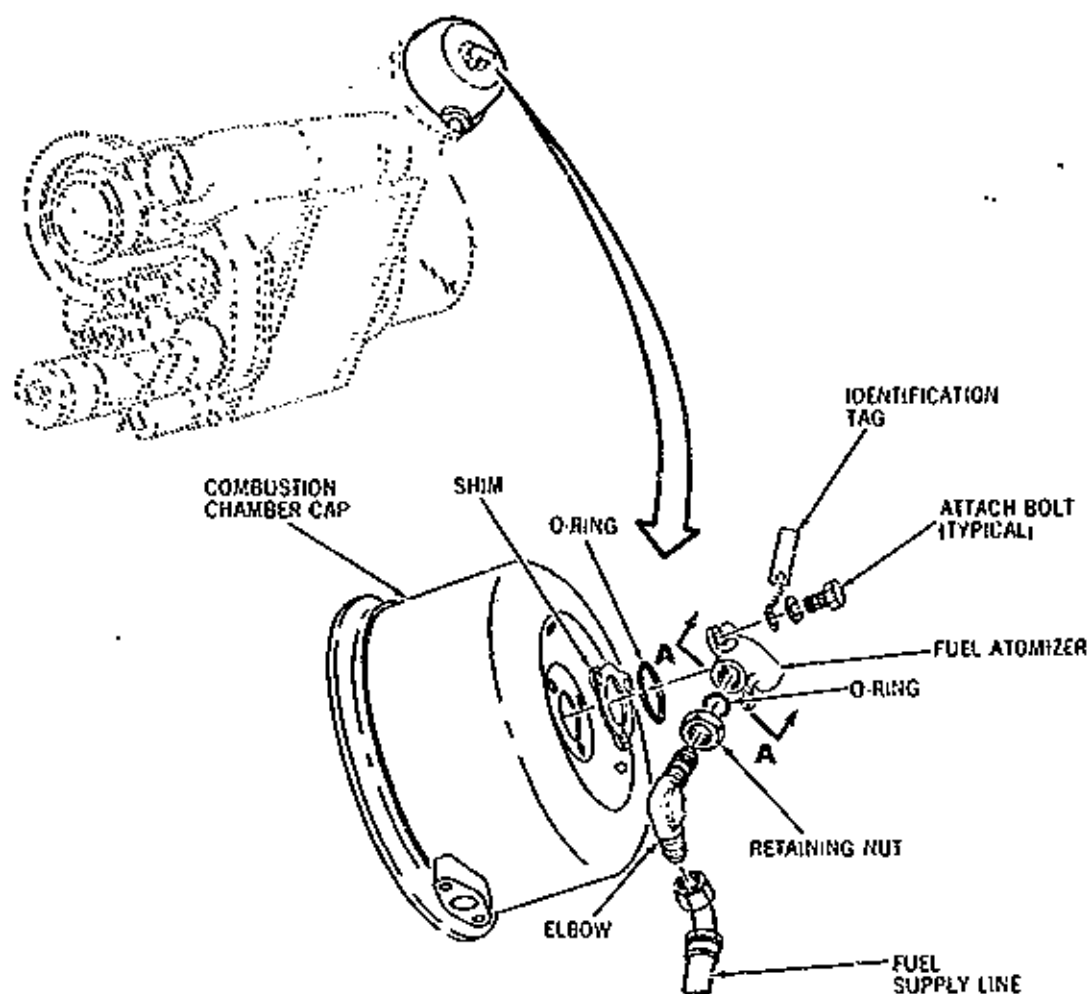
A. Remove Fuel Atomizer (See Figure 201)

- (1) Open and tag APU control circuit breaker located on battery bus section of circuit breaker panel.
- R (2) Remove APU engine housing combustor cap (see Overhaul Manual, Chapter  
R 49-00-1).
- (3) Disconnect atomizer fuel supply line.

**NOTE:** Container is required to catch a small amount of fuel that may be in line.

- (4) Remove atomizer attaching bolts, washers and identification tag.
- (5) Carefully remove atomizer and shim(s) (if installed). Retain shim(s).
- (6) Remove atomizer O-ring and discard.

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Fuel Atomizer -- Removal/Installation  
 Figure 201

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B. Install Fuel Atomzier

**CAUTION:** EXTREME CAUTION MUST BE EXERCISED DURING INSTALLATION OF FUEL ATOMZIER TO MAKE CERTAIN ATOMZIER OF CORRECT PART NUMBER IS INSTALLED. REPLACE REMOVED PART WITH ATOMIZER HAVING SAME AIRSEARCH PART NUMBER, OR STARTING DIFFICULTIES MAY OCCUR.

- (1) Make certain APU control circuit breaker located on battery bus section of circuit breaker panel is open and tagged.
- (2) Determine thickness requirements of atomzier shim(s) as follows:
  - (a) Measure dimensions A and B (see Figure 201).
  - (b) Subtract dimension B from dimension A. Record result as dimension C.
  - (c) If dimension C exceeds 0.055-inch, replace atomzier.
  - (d) If dimension C is less than 0.040-inch, subtract dimension C from 0.040-inch. Result equals thickness of shim(s) required between atomzier and combustion chamber cap.

**CAUTION:** MAKE CERTAIN CLEARANCE BETWEEN ATOMIZER AND COMBUSTION CHAMBER LINER GUARD IS BETWEEN 0.040 TO 0.055-INCH. INCORRECT CLEARANCE WILL CAUSE EXCESSIVE CARBON FORMATION IN COMBUSTION CHAMBER RESULTING IN REDUCED LIFE AND EFFICIENCY OF COMBUSTION CHAMBER COMPONENTS.

- (3) Lightly coat atomizer attaching bolt threads with compound, (Fel-Pro, C-5A).
- (4) Position atomzier with new O-ring and shim(s) (if required) on combustion chamber cap.
- (5) Install attaching bolts and washers. Tighten bolts to torque of 20 to 25 inch-pounds. Safety bolts with lockwire.
- (6) Install identification tag.
- (7) Connect atomizer fuel supply line.
- (8) Install APU engine housing combustor cap.
- (9) Remove tag and close APU control circuit breaker located on battery bus section of circuit breaker panel.



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TURBINE PLENUM DRAIN - MAINTENANCE PRACTICES

1. General

4. This maintenance practice provides removal/installation procedures for the turbine plenum drain valve. Access to the drain valve is through the APU engine housing aft cover.

WARNING: MAKE CERTAIN APU HAS COOLED SUFFICIENTLY AFTER SHUTDOWN TO PERMIT SKIN CONTACT. MAKE CERTAIN APU BATTERY SWITCH IN FLIGHT COMPARTMENT IS IN OFF POSITION.

2. Tools and Equipment Required

NOTE: Equivalent substitutes may be used instead of the following item.

<u>Item</u>	<u>Name</u>	<u>Number</u>	<u>Manufacturer</u>	<u>Use</u>
A	Lubricant	OS-124	The Monsanto Co. 800 N. Lindbergh Bl. St. Louis, MO 63166	To lubricate turbine plenum drain valve o-ring

3. Removal/Installation Turbine Plenum Drain Valve

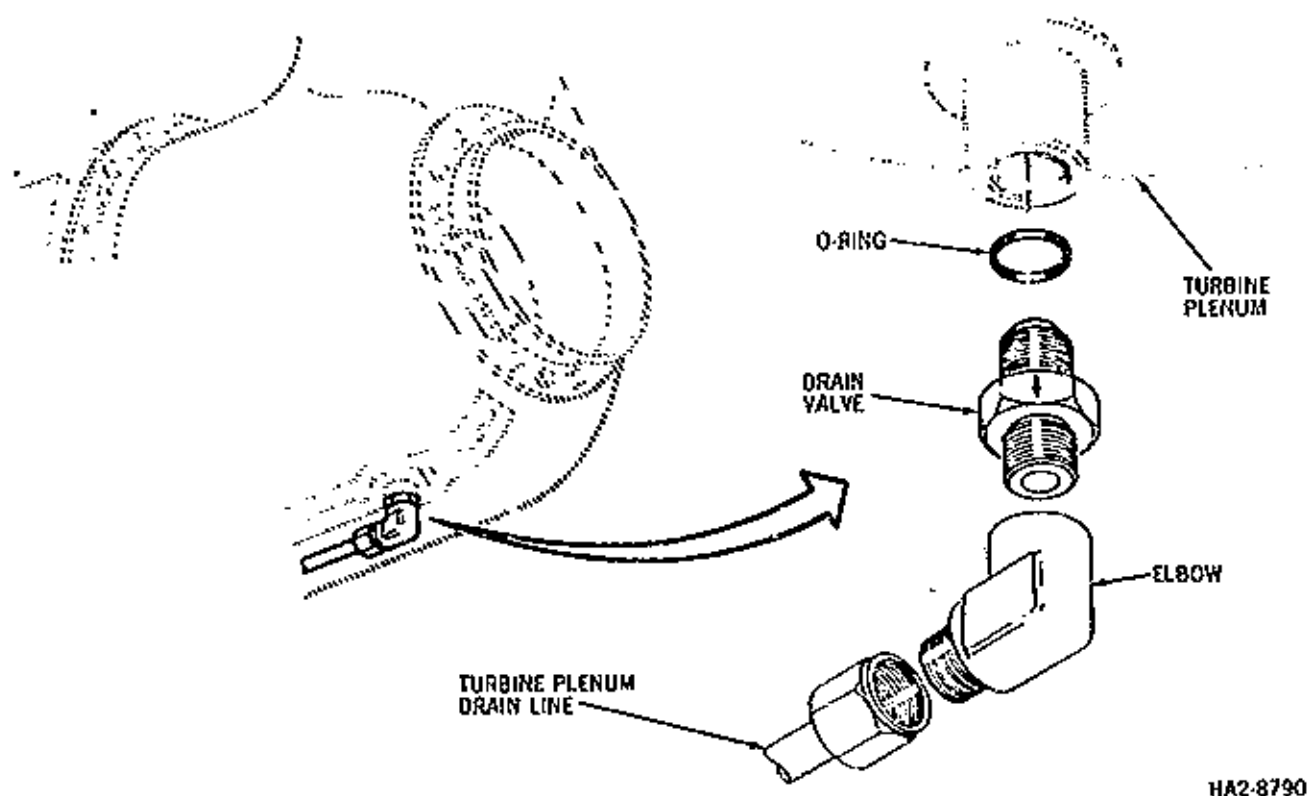
A. Remove Drain Valve

- (1) Open and tag APU control circuit breaker located on battery bus section of circuit breaker panel.
- R (2) Remove APU engine housing aft cover (see Overhaul Manual, Chapter  
R 49-00-1).
- (3) Disconnect turbine plenum drain line.
- (4) Remove drain valve. Discard o-ring.

B. Install Drain Valve

- (1) Make certain APU control circuit breaker located on battery bus section of circuit breaker panel is open and tagged.
- (2) Lightly lubricate new o-ring with lubricant (OS-124), and install on drain valve.
- (3) Install drain valve.
- (4) Connect turbine plenum drain line.
- R (5) Install APU engine housing aft cover (see Overhaul Manual, Chapter  
R 49-00-1).

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Turbine Plenum Drain Valve -- Removal/Installation  
Figure 201

- (6) Remove tag and close APU control circuit breaker located on battery bus section of circuit breaker panel.

4. Inspection/Check

A. Check Turbine Plenum Drain Valve

- (1) Check drain valve for cracks, corrosion and damage to threads.
- (2) Check that valve opening is free of obstruction.
- (3) Check drain valve for satisfactory operation.
  - (a) Connect air pressure hose and pressure gage to valve inlet.
  - (b) Apply air to valve and check valve closing pressure.
  - (c) Valve should close at 9 to 15 psig pressure.

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MAINTENANCE MANUAL

IGNITION/STARTING - TROUBLE SHOOTING

1. General

- A. Trouble shooting procedures for the APU Ignition/Starting system are outlined on Figure 101, sheets 1 through 3.
- B. Operators using AiResearch Tester No. 290270-2-1, should refer to 49-00, Adjustment/Test.

2. Tools and Equipment Required

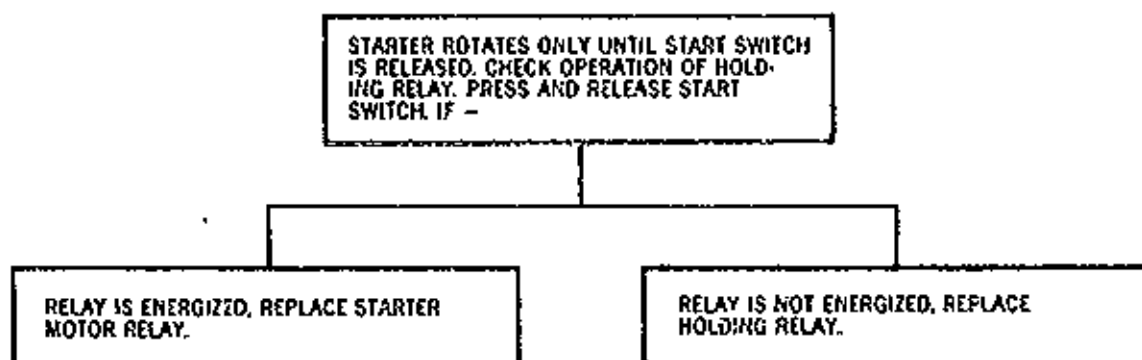
NOTE: Equivalent substitutes may be used instead of the following items:

<u>Item</u>	<u>Name</u>	<u>Number</u>	<u>Manufacturer</u>	<u>Use</u>
A	APU Tester	290270-2-1	AiResearch	For trouble shooting APU
B	APU Tester cable	294131-1-1	AiResearch	For trouble shooting APU

3. Trouble Shooting Ignition/Starting System

- A. For trouble shooting procedure, refer to Figure 101 and use applicable sheet.

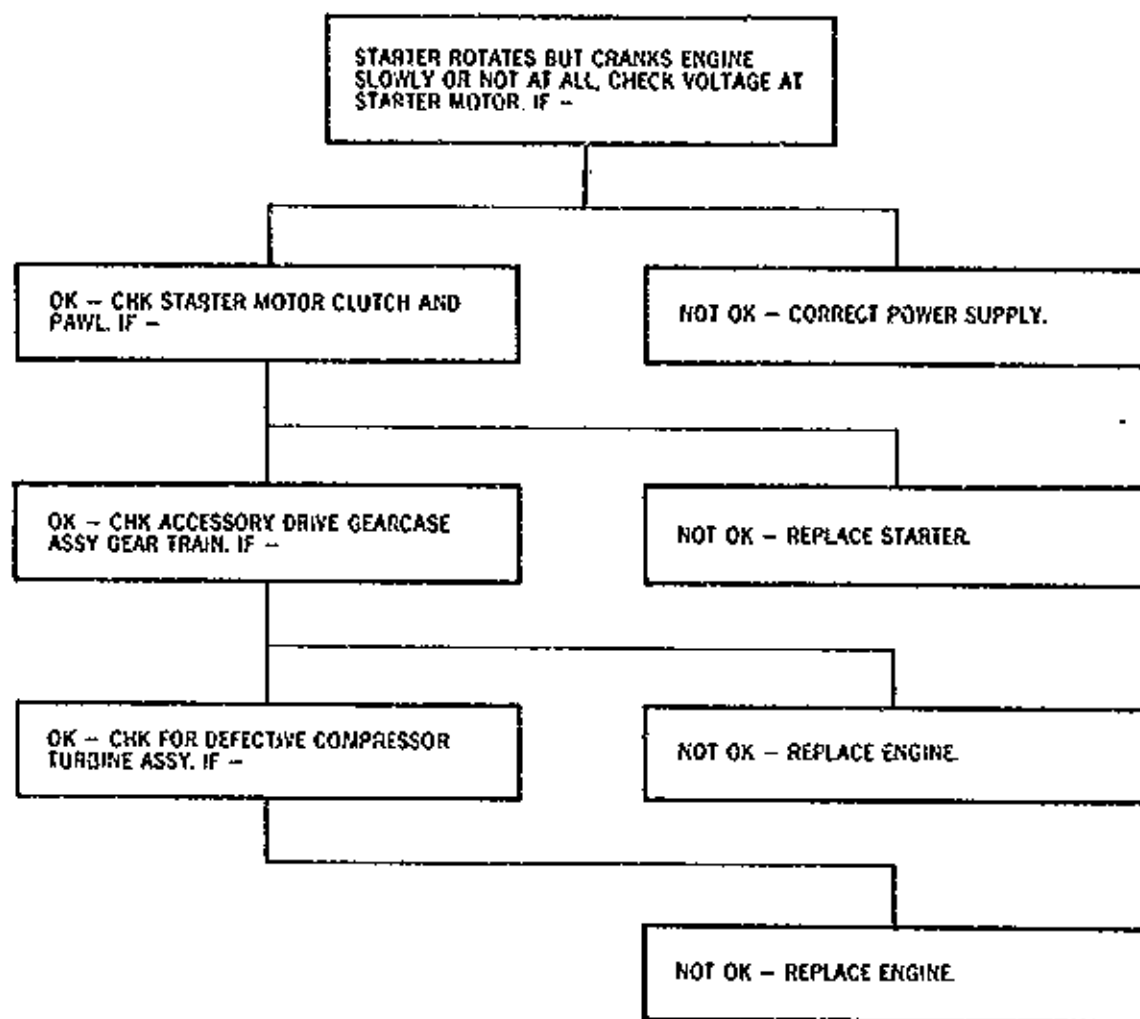
DOUGLAS AIRCRAFT CO., INC.  
**DC-8 SEVENTY SERIES**  
MAINTENANCE MANUAL



HA2-8785

Ignition/Starting -- Trouble Shooting  
Figure 101 (Sheet 1)

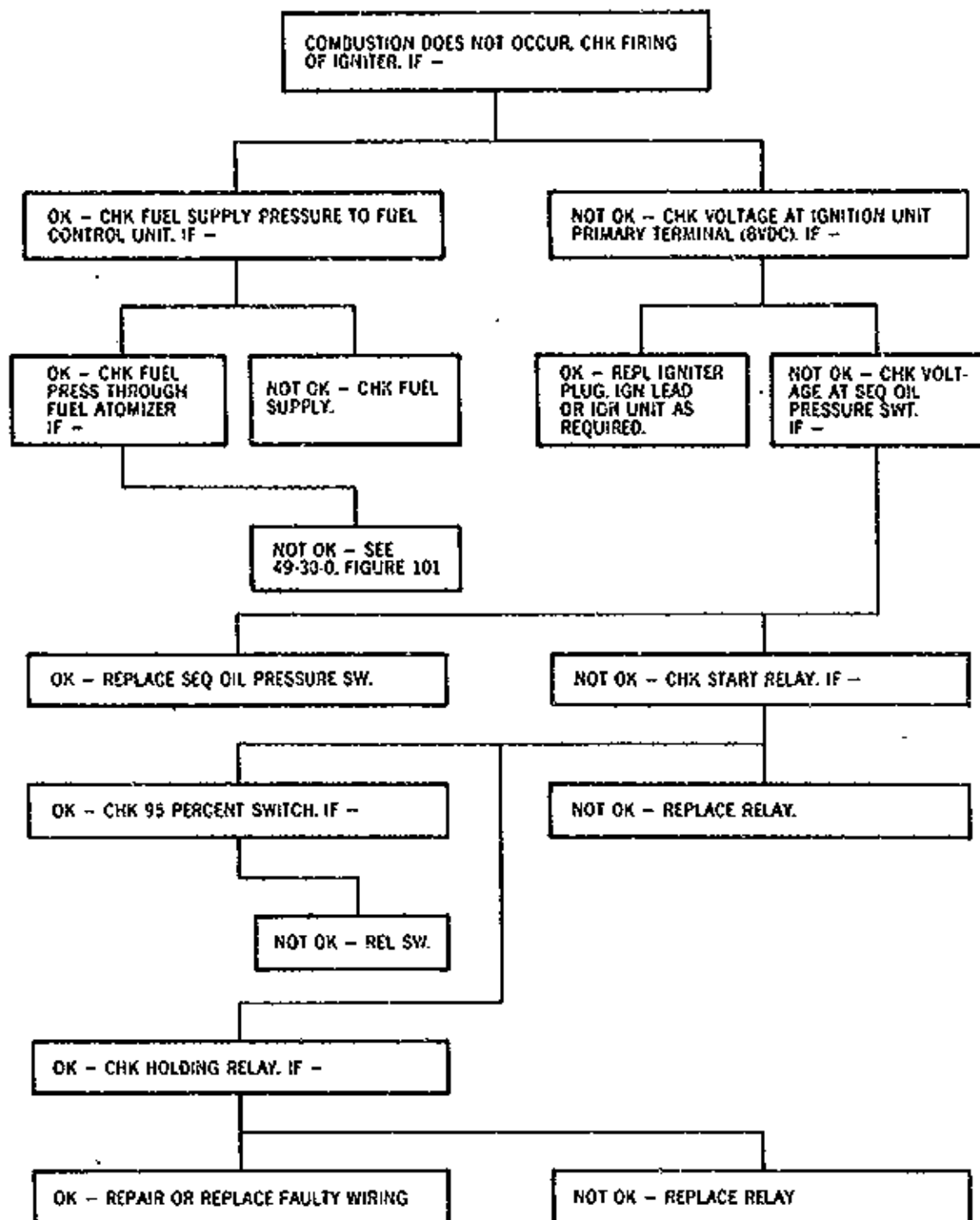
DOUGLAS AIRCRAFT CO., INC.  
**DC-8 SEVENTY SERIES**  
MAINTENANCE MANUAL



HA2-8787

Ignition/Starting -- Trouble Shooting  
Figure 101 (Sheet 2)

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**DC-8 SEVENTY SERIES**  
 MAINTENANCE MANUAL



1A2-8768

Ignition/Starting -- Trouble Shooting  
 Figure 101 (Sheet 3)

DOUGLAS AIRCRAFT CO., INC.  
**DC-8 SEVENTY SERIES**  
MAINTENANCE MANUAL

IGNITER PLUG - MAINTENANCE PRACTICES

1. General

- A. The igniter plug is mounted on the combustion chamber cap with a portion of the plug protruding into the combustion chamber cap and liner. Access to the igniter plug is through the APU engine housing combustor cap.

WARNING: MAKE CERTAIN APU HAS COOLED SUFFICIENTLY AFTER SHUTDOWN TO PERMIT SKIN CONTACT. MAKE CERTAIN APU BATTERY SWITCH IN FLIGHT COMPARTMENT IS IN OFF POSITION.

2. Tools and Equipment Required

NOTE: Equivalent substitutes may be used instead of the following items:

<u>Item</u>	<u>Name</u>	<u>Number</u>	<u>Manufacturer</u>	<u>Use</u>
A	Compound, High Temp.	Fel-Pro CS-A	Fel-Pro Inc. 7450 N. McCormick Boulevard Skokie, IL 60076	To coat igniter plug attaching bolt threads

3. Removal/Installation Igniter Plug

A. Remove Igniter Plug

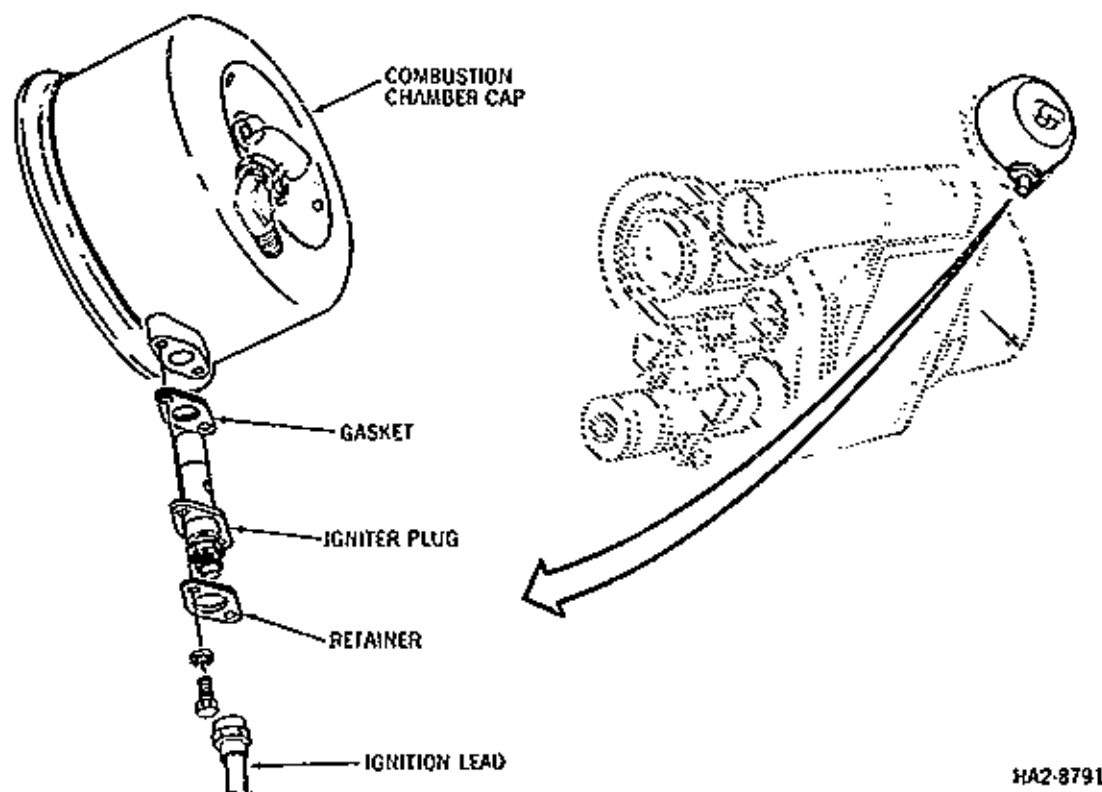
WARNING: IGNITER COIL UNIT VOLTAGE IS SUFFICIENTLY HIGH TO ENDANGER HUMAN LIFE. APU BATTERY SWITCH MUST BE IN OFF POSITION, AND IGNITION INOPERATIVE FOR AT LEAST 4 MINUTES BEFORE DISCONNECTING IGNITER PLUG LEAD. GROUND PLUG.

- (1) Open and tag APU control circuit breaker located on battery bus section of circuit breaker panel.
- (2) Remove APU engine housing combustor cap (see Overhaul Manual, Chapter 49-00-1).
- (3) Disconnect ignition lead from igniter plug.
- (4) Remove igniter plug attaching bolts, washers and retainer.
- (5) Carefully withdraw igniter plug from combustion chamber liner and cap. Discard igniter plug gasket.

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B. Install Igniter Plug .

- (1) Make certain APU control circuit breaker located on battery bus section of circuit breaker panel is open and tagged.
- (2) Coat igniter plug attaching bolt threads with compound (Fel-Pro C5-A).
- (3) Position new gasket on igniter plug.
- (4) Carefully insert igniter plug into combustion chamber cap and liner.
- (5) Install retainer, attaching bolts and washers. Tighten bolts to torque of 50 to 70 inch-pounds.
- (6) Connect igniter plug ignition lead.
- (7) Install APU engine housing combustor cap.
- (8) Remove tag and close APU control circuit breaker located on battery bus section of circuit breaker panel.



HA2-8791

Igniter Plug -- Removal/Installation  
Figure 201



DOUGLAS AIRCRAFT CO., INC.  
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IGNITION UNIT - MAINTENANCE PRACTICES

1. General

- R A. The Ignition unit is mounted on the left side of the APU module.

WARNING: MAKE CERTAIN APU HAS COOLED SUFFICIENTLY AFTER SHUTDOWN TO PERMIT SKIN CONTACT. MAKE CERTAIN APU BATTERY SWITCH IN FLIGHT COMPARTMENT IS IN OFF POSITION.

2. Removal/Installation Ignition Unit

A. Remove Ignition Unit

WARNING: IGNITION UNIT VOLTAGE IS SUFFICIENTLY HIGH TO ENDANGER HUMAN LIFE. APU BATTERY SWITCH MUST BE IN OFF POSITION AND IGNITION INOPERATIVE FOR AT LEAST 4 MINUTES BEFORE REMOVING IGNITION UNIT.

- (1) Open and tag APU control circuit breaker located on battery bus section of circuit breaker panel.
- R (2) Remove APU housing upper section (see Overhaul Manual, Chapter 49-00-1).
- R (3) Disconnect igniter plug lead from ignition unit.
- R (4) Disconnect ignition harness lead from ignition unit.
- R (5) Remove ignition unit connector nuts, washers, spacer, and gasket (inside APU housing lower section). Discard gasket.
- R (6) Remove ignition unit attaching bolts, washers and nuts.
- R (7) Remove ignition unit. Remove gasket (between unit and outer surface of APU housing lower section) and discard.

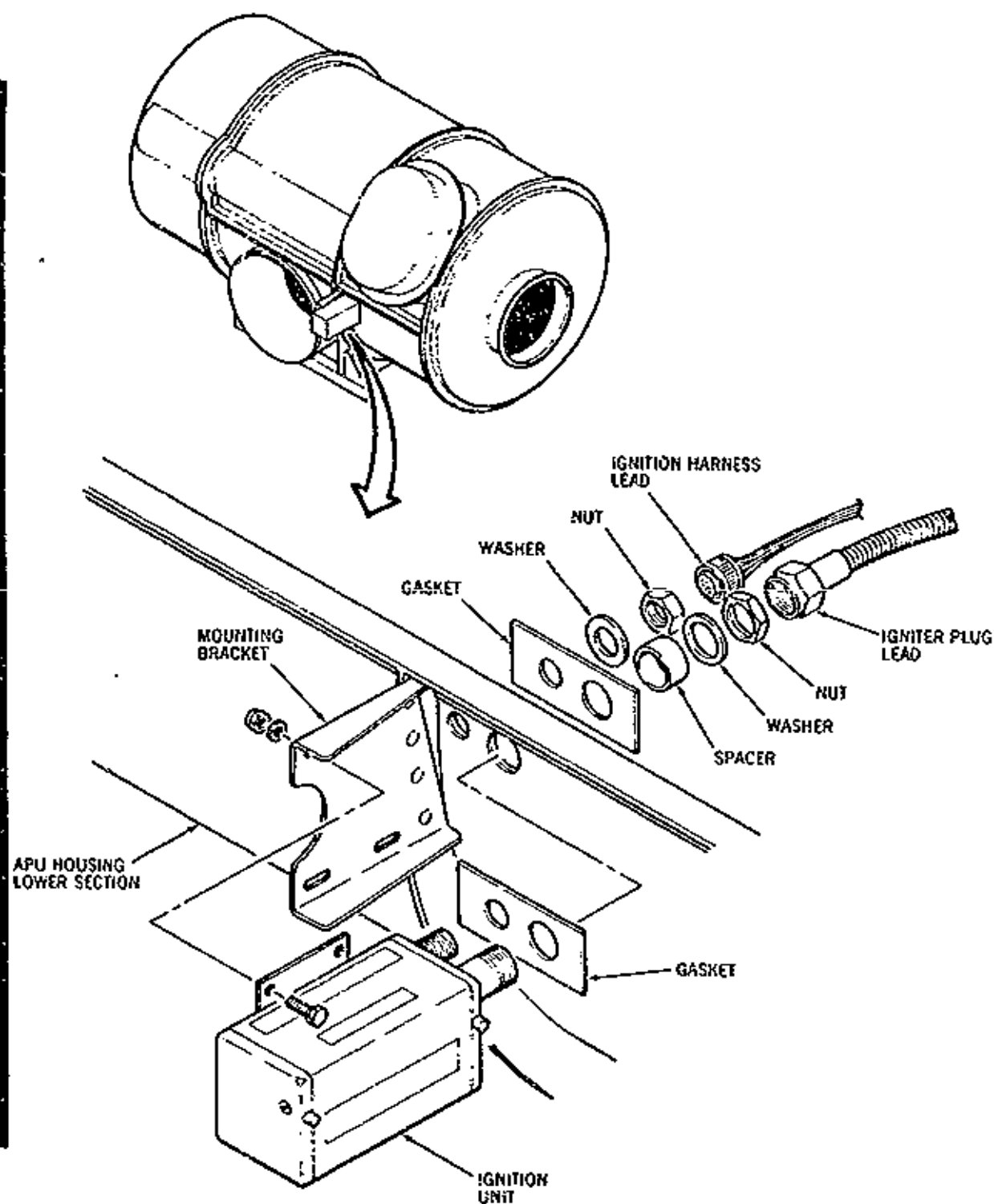
B. Install Ignition Unit

- (1) Make certain APU control circuit breaker located on battery bus section of circuit breaker panel is open and tagged.
- R (2) Install new gasket on ignition unit, insert connectors thru holes in APU housing lower section, and position unit on mounting bracket.
- R (3) Install new gasket and retained connector washers, spacer and nuts.
- R (4) Install ignition unit attaching bolts, washers, and nuts.

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- R (5) Connect ignition harness lead to ignition unit.
- R (6) Connect igniter plug lead to ignition unit.
- R (7) Install APU housing upper section (see Overhaul Manual, Chapter 49-00-1).
- R (8) Remove tag and close APU control circuit breaker located on battery bus section of circuit breaker panel.

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HA2-8792A

Ignition Unit -- Removal/Installation  
Figure 201

DOUGLAS AIRCRAFT CO., INC.  
**DC-8 SEVENTY SERIES**  
MAINTENANCE MANUAL

STARTER - MAINTENANCE PRACTICES

1. General

- A. The starter is mounted on the left side of the APU accessory drive case. Access to the starter is through the APU engine housing fwd cover.

WARNING: MAKE CERTAIN APU HAS COOLED SUFFICIENTLY AFTER SHUTDOWN TO PERMIT SKIN CONTACT. MAKE CERTAIN APU BATTERY SWITCH IN FLIGHT COMPARTMENT IS IN OFF POSITION.

CAUTION: IF STARTER IS BEING REMOVED DUE TO CLUTCH FAILURE, CHECK CLUTCH PORTION OF STARTER FOR MISSING PARTS. IF PARTS OF CLUTCH ARE MISSING: REMOVE OIL PUMP FOR OVERHAUL, DIS-ASSEMBLE ACCESSORY DRIVE GEARCASE TO EXTENT REQUIRED TO ENSURE ALL DEBRIS FROM FAILURE IS REMOVED AND MOVING PARTS ARE NOT DAMAGED, AND FLUSH ENGINE LUBRICATING SYSTEM PRIOR TO INSTALLATION OF NEW STARTER AND OIL PUMP.

2. Removal/Installation Starter

A. Remove Starter

- (1) Open and tag APU control circuit breaker located on battery bus section of circuit breaker panel.
- R (2) Remove APU engine housing fwd cover (see Overhaul Manual, Chapter  
R 49-00-1).
- (3) Tag and disconnect electrical leads from starter terminals.
- (4) Remove nuts from starter mounting studs.

NOTE: Starter should be supported before removing last nut.

- (5) Carefully withdraw starter from mounting studs.
- (6) Remove O-ring from accessory gearcase and discard.

B. Install Starter

- (1) Make certain APU control circuit breaker located on battery bus section of circuit breaker panel is open and tagged.
- (2) Install new O-ring in accessory gearcase.
- (3) Position starter on mounting studs exercising care as starter clutch enters gearcase.

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AIR - TROUBLE SHOOTING

1. General

- A. Trouble shooting procedures for the APU bleed air system are outlined on Figure 101.
- B. Operators using AiResearch Tester No. 290270-2-1, should refer to 49-00, Adjustment/Test.

2. Tools and Equipment Required

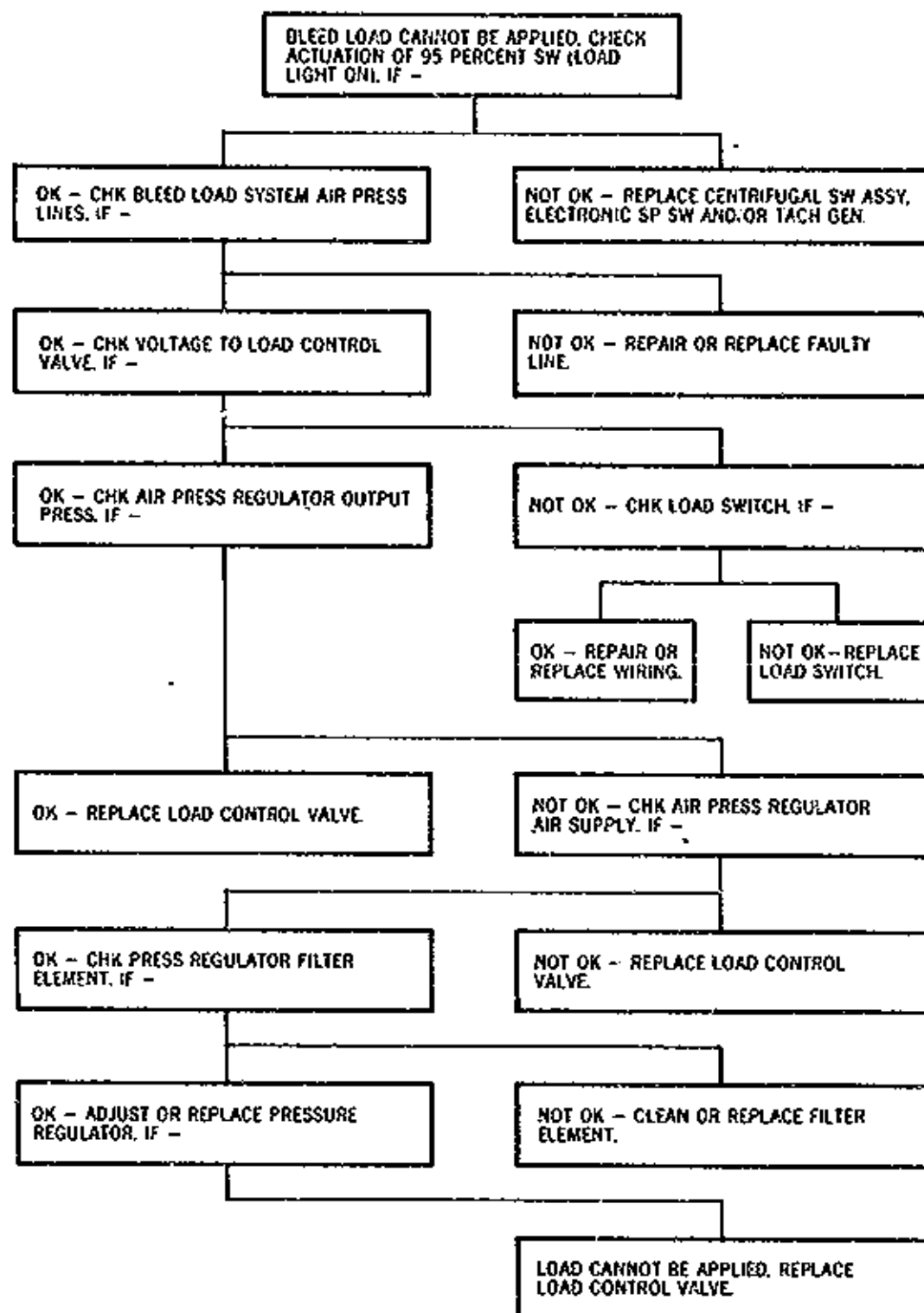
NOTE: Equivalent substitutes may be used instead of the following items.

<u>Item</u>	<u>Name</u>	<u>Number</u>	<u>Manufacturer</u>	<u>Use</u>
A	APU Tester	290270-2-1	AiResearch	For trouble shooting APU bleed air system
B	APU Tester cable	294131-1-1	AiResearch	For trouble shooting APU bleed air system

3. Trouble Shooting APU Bleed Air System

- A. For trouble shooting procedures, refer to Figure 101.

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HA2-8803

Air - Trouble Shooting  
 Figure 101

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MAINTENANCE MANUAL

LOAD CONTROL VALVE - MAINTENANCE PRACTICES

1. General

- R A. The load control valve is installed between the APU module bleed air duct  
R and the bleed air check valve. The control valve is located on the left  
side of the APU module between fuselage stations 560.00 and 580.00  
(stations 580.00 and 600.00 for No. 2 APU, if installed). Access to the  
R control valve is through the forward cargo compartment door.

WARNING: MAKE CERTAIN APU HAS COOLED SUFFICIENTLY AFTER SHUTDOWN  
TO PERMIT SKIN CONTACT. MAKE CERTAIN APU BATTERY SWITCH  
IN FLIGHT COMPARTMENT IS IN OFF POSITION.

2. Removal/Installation Load Control Valve

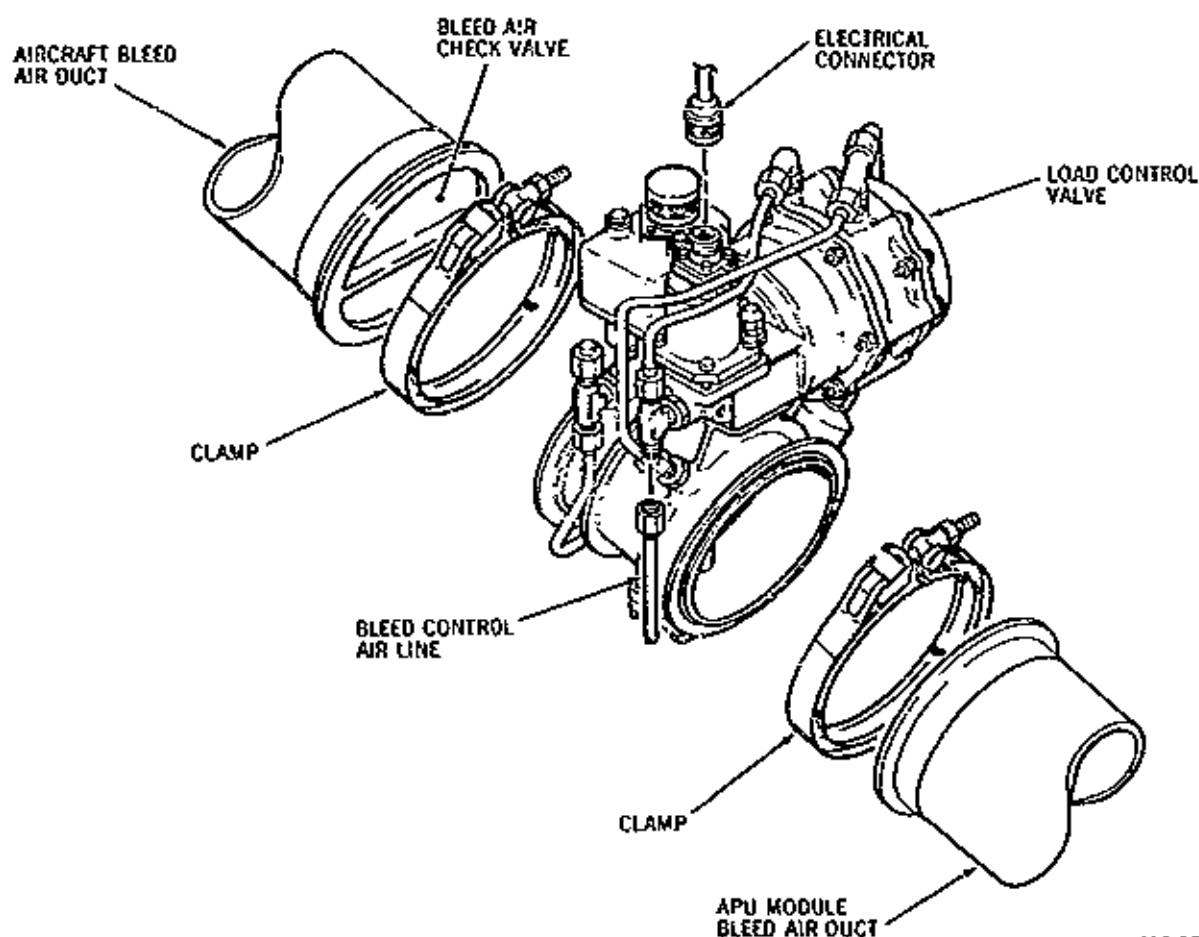
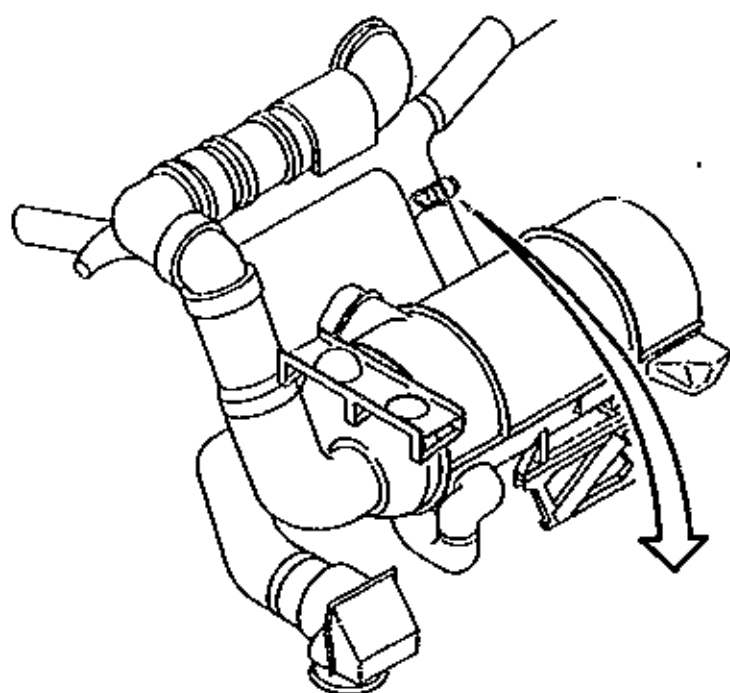
A. Remove Load Control Valve (See Figure 201)

- (1) Open and tag APU control circuit breaker located on battery bus section  
of circuit breaker panel.
- R (2) Disconnect valve electrical connector.
- (3) Disconnect bleed control air line from tee fitting.
- (4) Remove clamp connecting valve to APU module bleed air duct.
- R (5) Support valve and remove clamp connecting valve to bleed air check valve  
R and aircraft bleed air duct.
- (6) Remove valve.

B. Install Load Control Valve

- (1) Make certain APU control circuit breaker located on battery bus section  
of circuit breaker panel is open and tagged.
- R (2) Position valve between APU module bleed air duct and bleed air check  
R valve.
- (3) Install connecting clamps and tighten loosely.
- (4) Rotate valve and align and connect bleed control air line to tee  
fitting.

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HA2-8794A

Load Control Valve -- Removal/Installation  
 Figure 201



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MAINTENANCE MANUAL

- (5) Tighten connecting clamps.
- R (6) Connect valve electrical connector.
- (7) Remove tag and close APU control circuit breaker located on battery bus section of circuit breaker panel.
- R (8) Perform functional test and make necessary adjustments to load control valve, (See 49-00, Adjustment/Test).

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BLEED AIR DUCTS - MAINTENANCE PRACTICES

1. General

- A. The bleed air ducts consist of four duct sections installed between the APU module housing bleed air adapter and the load control valve. All ducts are located and are accessible within the forward cargo compartment.

2. Removal/Installation Bleed Air Ducts

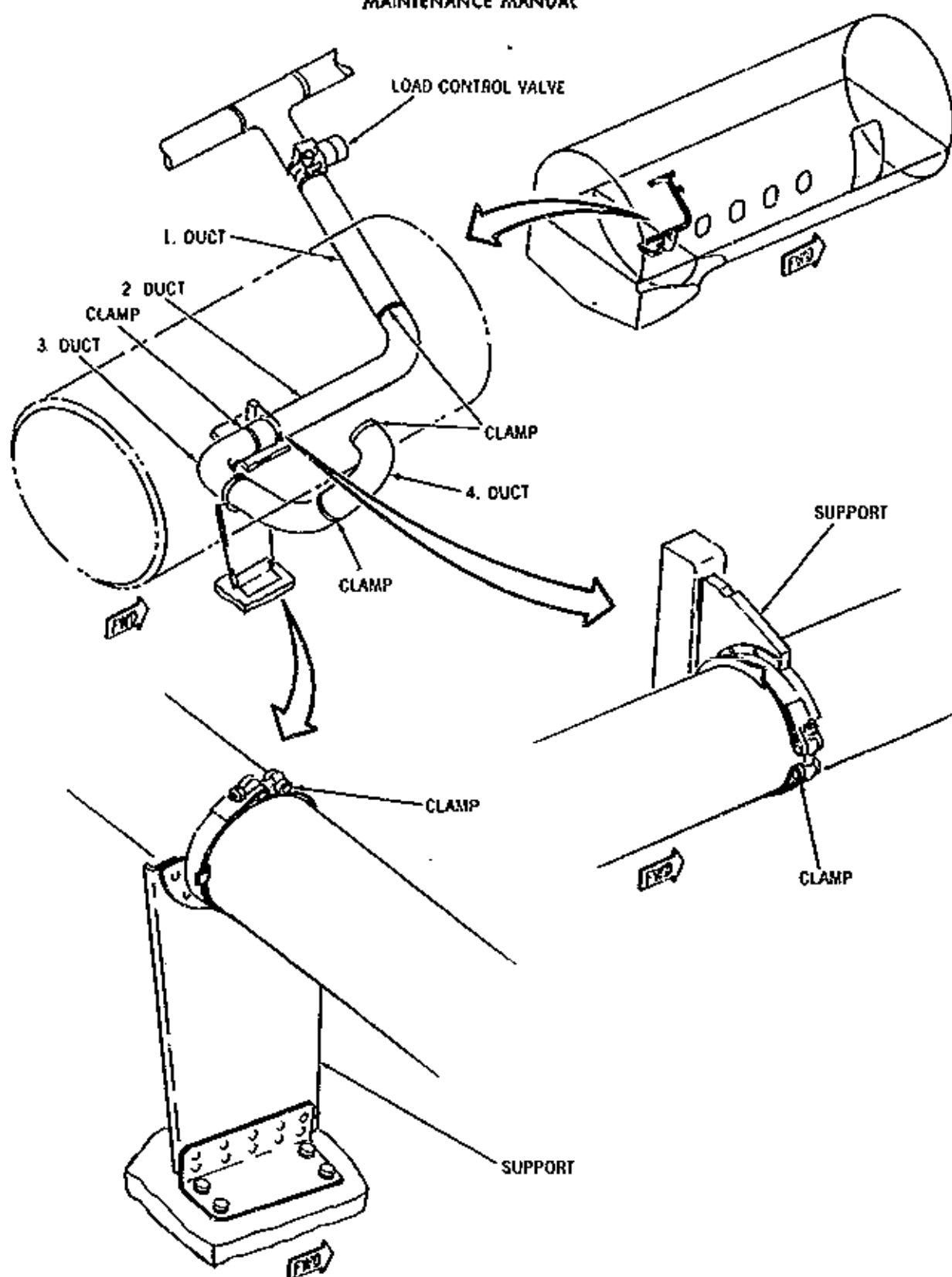
A. Remove Bleed Air Ducts (See figure 201)

- (1) Open and tag APU control circuit breaker located on battery bus section of circuit breaker panel.
- (2) Remove clamps connecting duct (1) to load control valve and duct (2).
- (3) Remove duct (1).
- (4) Disconnect duct (2) support clamp.
- (5) Remove clamp connecting duct (2) to duct (3) and remove duct (2).
- (6) Disconnect duct (3) support clamp.
- (7) Remove clamp connecting duct (3) to duct (4) and remove duct (3).
- (8) Remove clamp connecting duct (4) to APU module housing bleed air adapter and remove duct (4).

B. Install Bleed Air Ducts

- (1) Make certain APU control circuit breaker located on battery bus section of circuit breaker panel is open and tagged.
- (2) Align duct (4) flange with APU module housing bleed air adapter and install connecting clamp loosely.
- (3) Position duct (3) on support and install support clamp loosely.
- (4) Align duct (3) flange with flange of duct (4) and install connecting clamp loosely.
- (5) Position duct (2) on support and install support clamp loosely.
- (6) Align duct (2) flange with flange of duct (3) and install connecting clamp loosely.

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Bleed Air Ducts -- Removal/Installation  
Figure 201

HA2-8840

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ACCESSORY COOLING AIR FAN - MAINTENANCE PRACTICES

1. General

- A. The accessory cooling air fan is mounted on the upper left side of the APU accessory drive gearcase. Access to the cooling air fan is through the APU engine housing fwd cover and upper section.

WARNING: MAKE CERTAIN APU HAS COOLED SUFFICIENTLY AFTER SHUTDOWN TO PERMIT SKIN CONTACT. MAKE CERTAIN APU BATTERY SWITCH IN FLIGHT COMPARTMENT IS IN OFF POSITION.

2. Tools and Equipment Required

NOTE: Equivalent substitutes may be used instead of the following item.

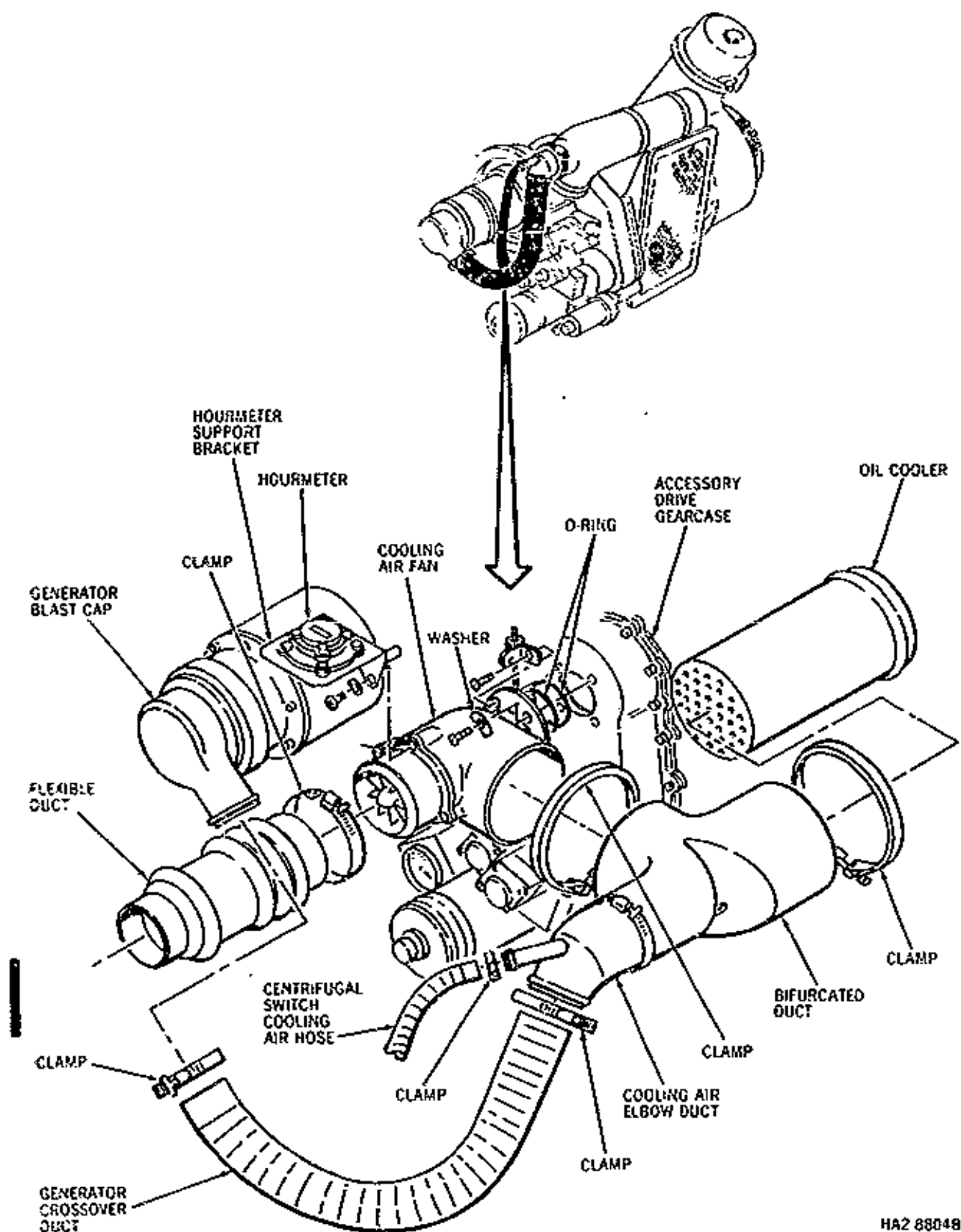
<u>Item</u>	<u>Name</u>	<u>Number</u>	<u>Manufacturer</u>	<u>Use</u>
A	Oil	MIL-L-7808 or MIL-L-23699A		To lubricate cooling air fan O-rings

3. Removal/Installation Accessory Cooling Air Fan

A. Remove Cooling Air Fan

- (1) Open and tag APU control circuit breaker located on battery bus section of circuit breaker panel.
- R (2) Remove APU engine housing fwd cover and upper section (see Overhaul  
R Manual, Chapter 49-00-1).
- (3) Remove hourmeter support bracket attaching bolts. Secure hourmeter and bracket to clear maintenance area.
- R (4) Remove clamp connecting generator crossover duct to cooling air elbow  
duct.
- (5) Remove clamp connecting generator crossover duct to generator blast cap.
- (6) Remove generator crossover duct.
- R (6a) Remove clamp connecting centrifugal switch cooling air hose to elbow  
R duct and disconnect hose.
- (7) Remove clamp connecting bifurcated duct to oil cooler.
- (8) Remove clamp connecting bifurcated duct to cooling air fan.
- R (9) Remove bifurcated duct and cooling air duct elbow as a unit.

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Accessory Cooling Air Fan -- Removal/Installation  
 Figure 201

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- MAINTENANCE MANUAL

- (10) Remove clamp connecting cooling air flexible duct to cooling air fan, and remove duct.
- (11) Remove bolts and washers attaching cooling air fan to accessory drive gearcase.
- (12) Carefully disengage cooling air fan drive shaft splines and remove fan.

**CAUTION:** PULL COOLING AIR FAN SLOWLY OUT OF GEARCASE IN A STRAIGHT LINE TO PREVENT DAMAGE TO FAN DRIVE SHAFT AND/OR ACCESSORY DRIVE SPLINES.

- (13) Remove and discard O-rings.

**B. Install Cooling Air Fan**

- (1) Make certain APU control circuit breaker located on battery bus section of circuit breaker panel is open and tagged.
- (2) Lightly coat new O-rings with oil (MIL-L-7808 or MIL-L-23699A), and install on cooling air fan.
- (3) Carefully insert cooling air fan drive shaft into accessory gearcase, and engage splines.
- (4) Lightly coat cooling air fan attaching bolt threads with oil (MIL-L-7808 or MIL-L-23699A), and install bolts and washers. Tighten bolts to torque of 50 to 70 inch-pounds.
- (5) Position cooling air flexible duct on cooling air fan, and install connecting clamp.
- (6) Position bifurcated duct on cooling air fan and oil cooler, and install connecting clamps.
- R (7) Position generator crossover duct on end of cooling air elbow duct and generator blast cap. Install connecting clamps.
- R (7a) Connect centrifugal switch cooling air hose to elbow duct and install clamp.
- R (8) Position hourmeter support bracket on cooling air fan, and install attaching bolts.
- R (9) Install APU engine housing upper section and fwd cover (see Overhaul Manual, Chapter 49-00-1).
- (10) Remove tag and close APU control circuit breaker located on battery bus section of circuit breaker panel.

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APU MODULE COOLING AIR DUCTS - MAINTENANCE PRACTICES

1. General

- A. The APU cooling air ducts consist of two duct sections installed between the APU engine air intake duct and the APU module cooling air inlet adapter. Removal/Installation procedures for the left and right (if installed) cooling air ducts are identical.

2. Removal/Installation APU Module Cooling Air Ducts

- A. Remove Cooling Air Ducts (See Figure 201)

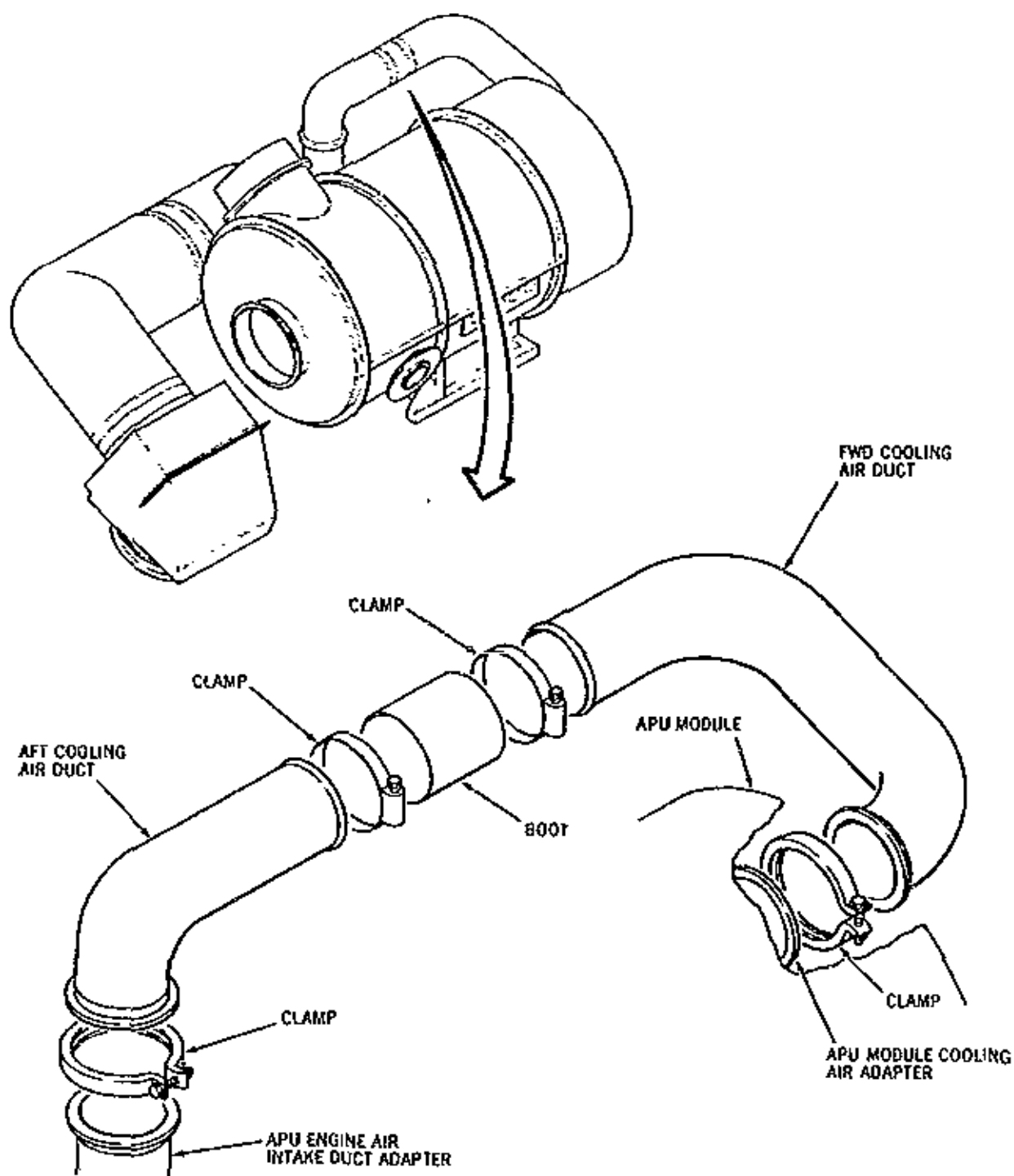
CAUTION: TO PREVENT DAMAGE TO DUCTS, SUPPORT DUCTS BEFORE REMOVING CONNECTING CLAMPS.

- (1) Open and tag APU control circuit breaker located on battery bus section of circuit breaker panel.
- (2) Remove clamps connecting splice boot to fwd and aft cooling air ducts.
- (3) Remove clamp connecting fwd duct to APU module cooling air adapter, and remove duct.
- (4) Remove splice boot.
- (5) Remove clamp connecting aft duct to APU engine air intake duct, and remove duct.

- B. Install Cooling Air Ducts

- (1) Make certain APU control circuit breaker located on battery bus section of circuit breaker panel is open and tagged.
- (2) Position aft duct flange on APU engine air intake duct adapter flange and install connecting clamp loosely.
- (3) Install splice boot on fwd end of aft duct.
- (4) Insert aft end of fwd duct into splice boot, and install boot connecting clamps loosely.
- (5) Position fwd duct flange on APU module cooling air adapter flange and install connecting clamp loosely.

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HA2-8805

Cooling Air Ducts -- Removal/Installation  
Figure 201



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APU ENGINE AIR INLET DUCTS - MAINTENANCE PRACTICES

1. General

- A. The APU engine air inlet ducts consist of two elbow duct sections and an inlet plenum. Removal/Installation procedures for the left and right (if installed) air inlet ducts are identical.

2. Removal/Installation APU Air Inlet Ducts

- A. Remove Air Inlet Ducts (See Figure 201).

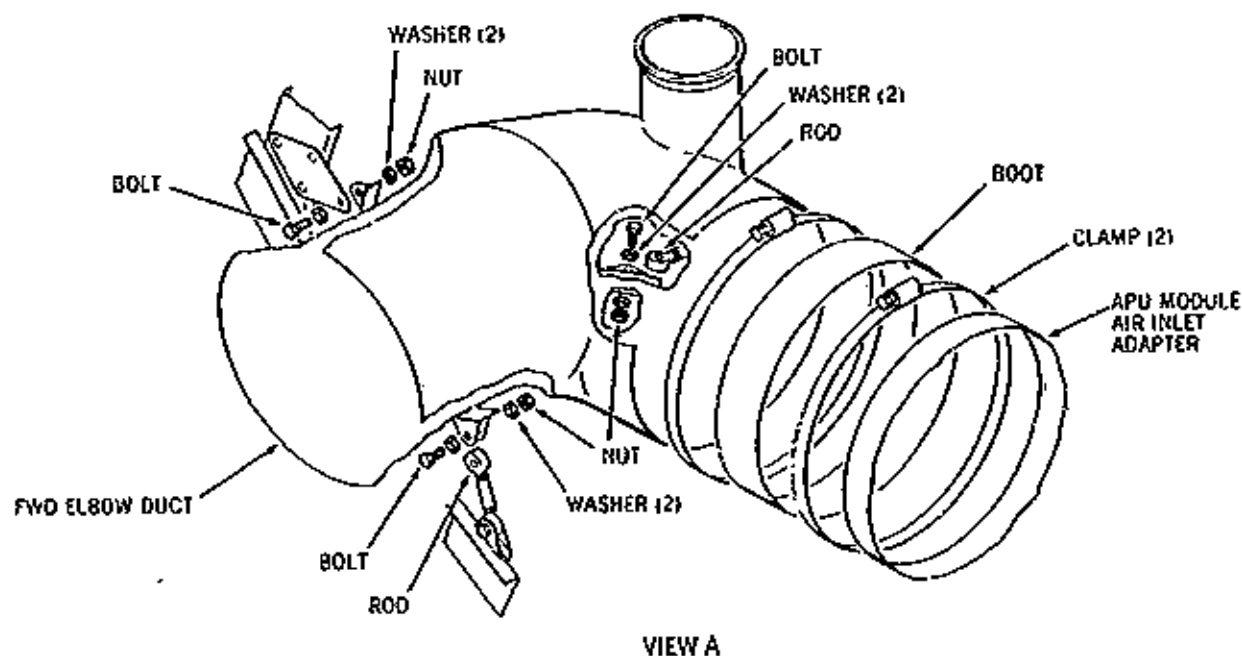
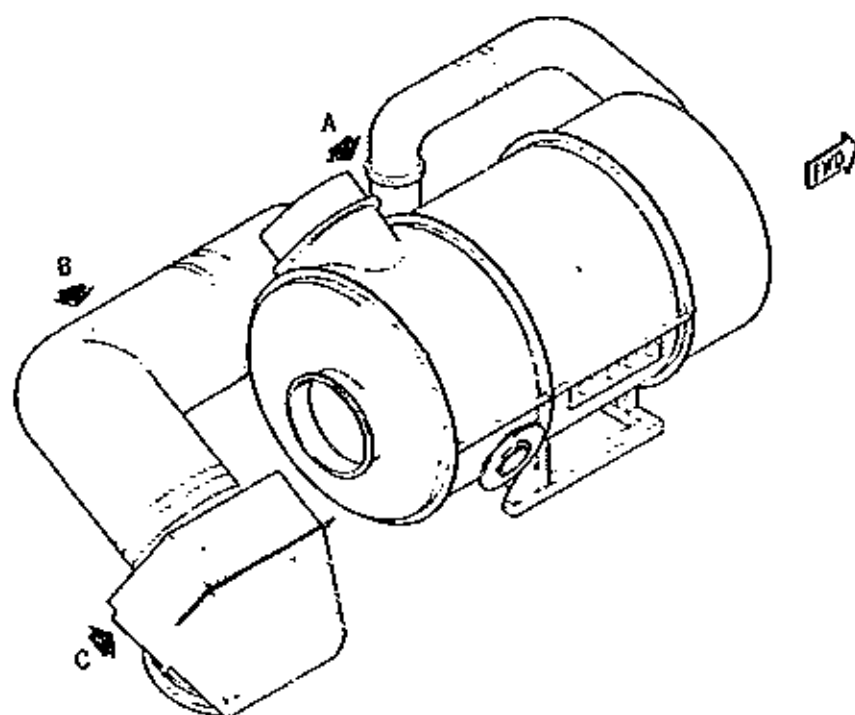
CAUTION: TO PREVENT DAMAGE TO DUCTS, SUPPORT DUCTS BEFORE REMOVING CONNECTING CLAMPS.

- (1) Open and tag APU control circuit breaker located on battery bus section of circuit breaker panel.
- (2) Remove APU module cooling air ducts (see 49-50-4).
- (3) Remove duct support connecting bolts, washers and nuts.
- (4) Remove clamps connecting splice boot to fwd and aft air inlet elbow ducts.
- (5) Remove clamps connecting fwd elbow duct to splice boot on APU module engine air inlet adapter, and remove elbow duct.
- (6) Remove splice boots from APU module engine air inlet adapter and fwd end of aft elbow duct.
- (7) Remove clamps connecting aft elbow duct to splice boot on inlet plenum, and remove elbow duct.
- (8) Remove splice boot from inlet plenum.
- (9) Disconnect inlet plenum door actuator electrical connector.
- (10) Disconnect electrical wires from inlet plenum door stop switches.
- (11) Remove inlet plenum attaching bolts. Remove inlet plenum, gasket(s), and spacer (left APU only). Discard gasket(s).
- R (12) On APU with inlet screen, remove screen from inlet duct.

B. Install Air Inlet Ducts

NOTE: At all duct joints, two connecting clamps should be installed in tandem to obtain the required clamping area.

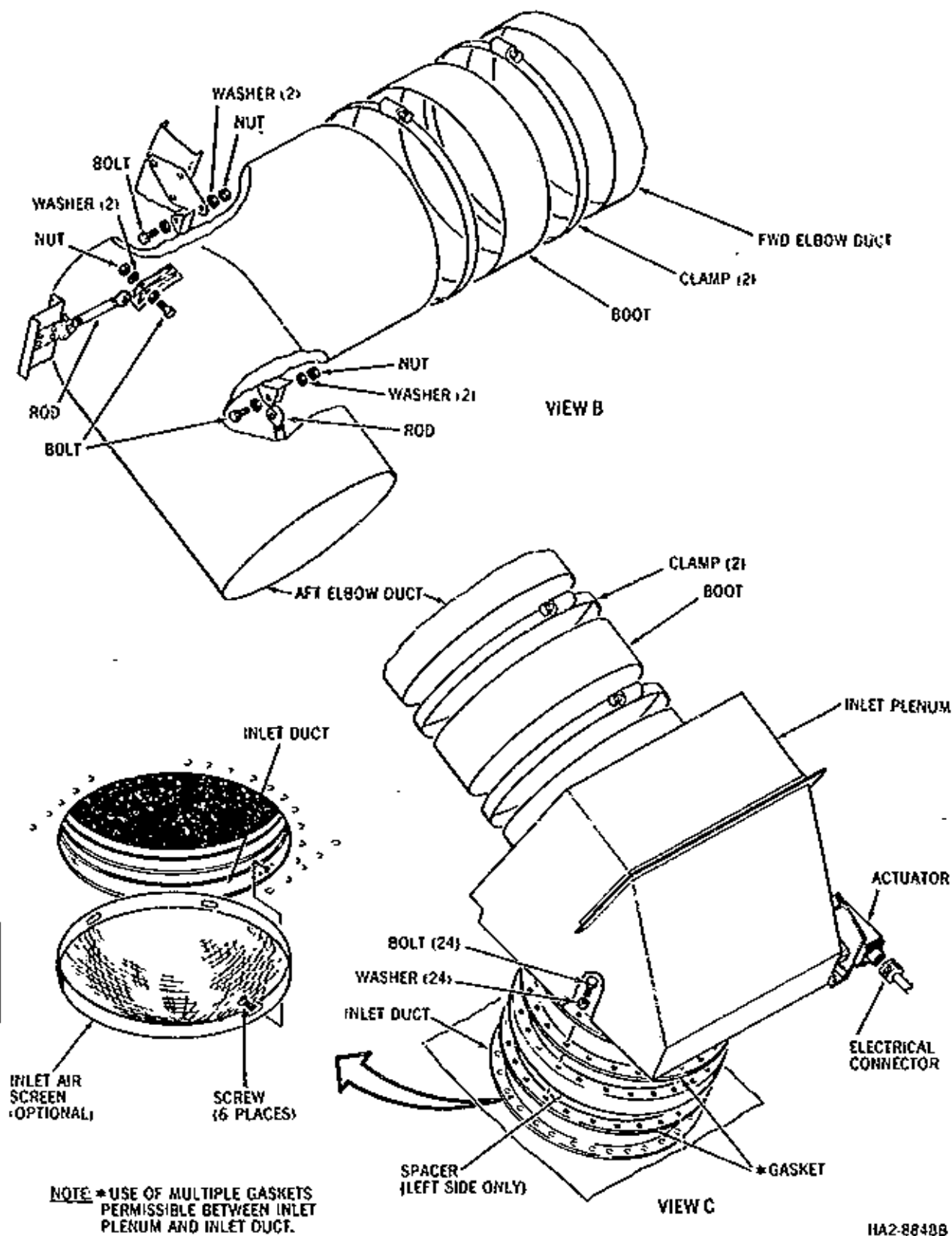
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APU Engine Air Inlet Ducts -- Removal/Installation  
 Figure 201 (Sheet 1)

HA2-8839A

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HA2-88488

APU Engine Air Inlet Ducts -- Removal/Installation  
 Figure 201 (Sheet 2)

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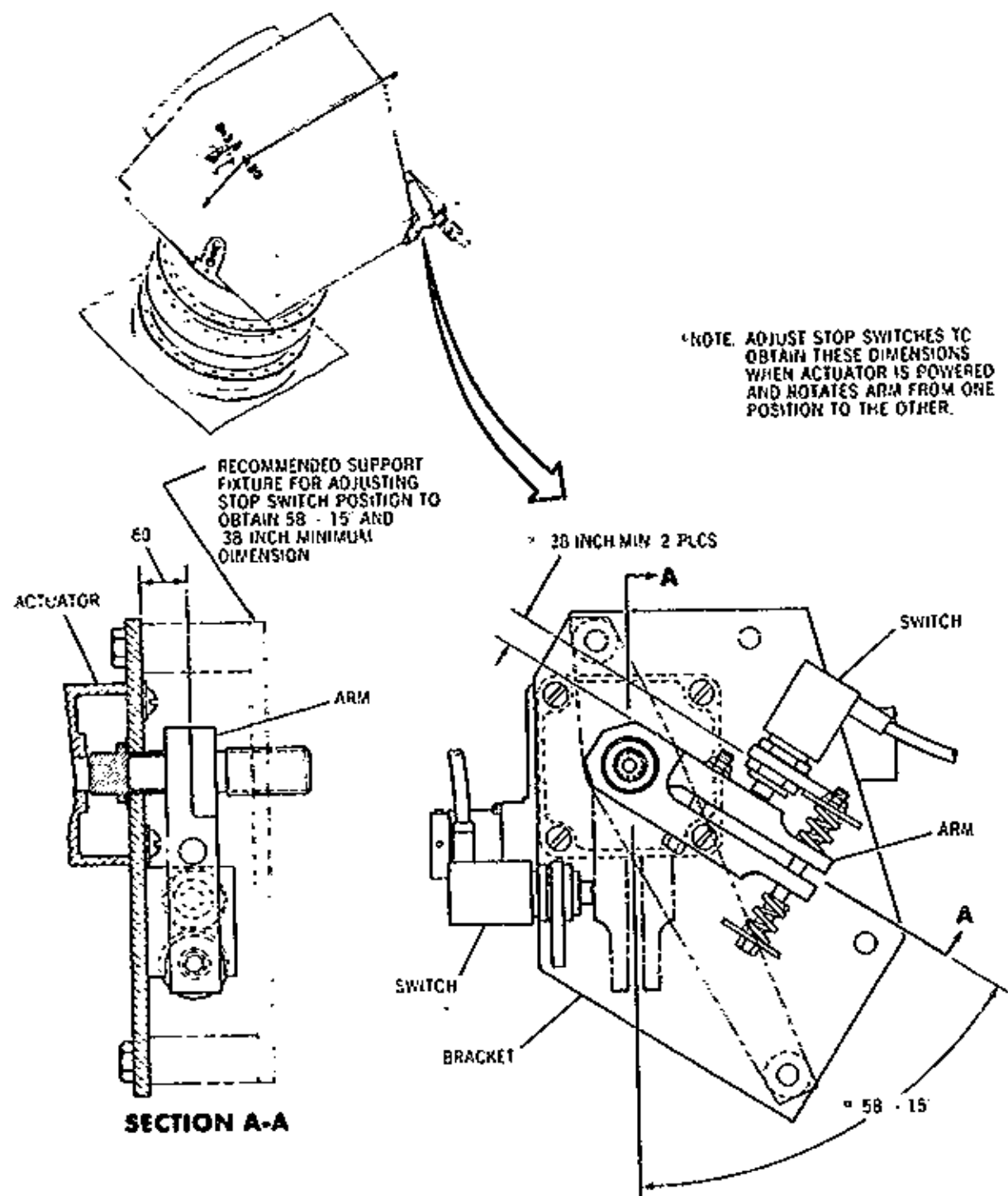
- (1) Make certain APU control circuit breaker located on battery bus section of circuit breaker panel is open and tagged.
- (1a) On APU with inlet screen, install screen in inlet duct.
- (2) Position new gasket(s), spacer (left APU only) and inlet plenum on air inlet duct and install attaching bolts.
- NOTE:** The use of multiple gaskets between inlet plenum and inlet duct is permissible.
- (3) Connect inlet plenum door actuator electrical connector.
- (4) Connect electrical wires to inlet plenum door actuator stop switches.
- (5) Install splice boot on inlet plenum.
- (6) Insert aft end of aft elbow duct into splice boot on inlet plenum, and install connecting clamps loosely.
- (7) Align duct supports with lugs on aft elbow duct and install connecting bolts, washers and nuts loosely.
- (8) Install splice boots on fwd end of aft elbow duct and APU module engine air inlet adapter.
- (9) Insert ends of fwd duct elbow into splice boots on aft duct and APU module engine air inlet adapter. Install connecting clamps loosely.
- (10) Align duct supports with lugs on fwd elbow duct and install connecting bolts, washers and nuts loosely.
- (11) Check that fwd and aft elbow ducts are properly aligned. Tighten all connecting clamps.
- (12) Tighten all duct support connecting bolts.
- (13) Install APU module cooling air ducts (see 59-40-4).
- (14) Remove tag and close APU control circuit breaker located on battery bus section of circuit breaker panel.

R 3. Inlet Plenum Door Stop Switch Adjustment

R A. Adjust Stop Switches

- R (1) Adjust inlet plenum door stop switches in accordance with instructions  
R shown on Figure 202.

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HA2-8966

Inlet Plenum Door Stop Switches -- Adjustment  
 Figure 202

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MAINTENANCE MANUAL

PNEUMATIC THERMOSTAT - MAINTENANCE PRACTICES

1. General

- A. The pneumatic thermostat is mounted on the lower section of the APU turbine plenum flange with the thermostat body extending into the exhaust path. Access to the thermostat is through the APU engine housing aft cover.

WARNING: MAKE CERTAIN APU HAS COOLED SUFFICIENTLY AFTER SHUTDOWN TO PERMIT SKIN CONTACT. MAKE CERTAIN APU BATTERY SWITCH IN FLIGHT COMPARTMENT IS IN OFF POSITION.

2. Tools and Equipment Required

NOTE: Equivalent substitutes may be used instead of the following item.

<u>Item</u>	<u>Name</u>	<u>Number</u>	<u>Manufacturer</u>	<u>Use</u>
A	Compound, High Temp.	Fel-Pro C-5A	Fel-Pro Inc., Div of Felt Products Mfg. Co. 7450 N. McCormick Pl., Skokie, IL 60076	To lubricate thermostat attaching bolt threads

3. Removal/Installation Pneumatic Thermostat

A. Remove Pneumatic Thermostat

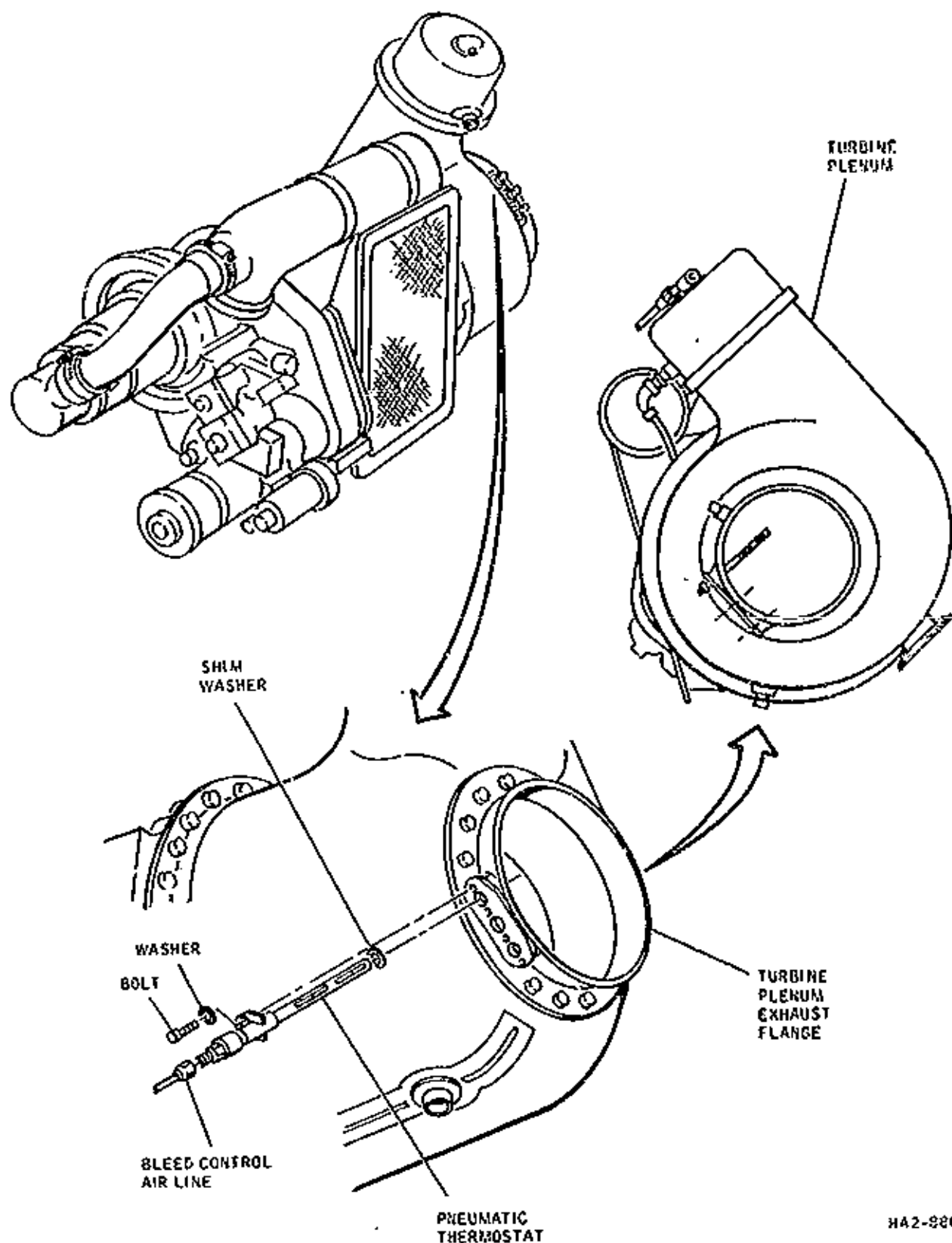
- (1) Open and tag APU control circuit breaker located on battery bus section of circuit breaker panel.
- R (2) Remove APU engine housing aft cover (see Overhaul Manual, Chapter  
R 49-00-1).
- (3) Disconnect bleed control air line from thermostat.

CAUTION: HOLD THERMOSTAT HEX FITTING WITH WRENCH TO PREVENT THERMOSTAT COLLAR FROM ROTATING WHEN DISCONNECTING BLEED CONTROL AIR LINE OR THERMOSTAT SETTING COULD CHANGE AND POSSIBLY CREATE AN OVERTEMPERATURE CONDITION.

- (4) Remove thermostat attaching bolt and washer.
- (5) Carefully remove thermostat and shim washers from turbine plenum mounting boss.

NOTE: Record amount and thickness of shims washers to facilitate installation.

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MAINTENANCE MANUAL



HA2-2206

Pneumatic Thermostat -- Removal/Installation  
Figure 201

DOUGLAS AIRCRAFT CO., INC.  
**DC-8 SEVENTY SERIES**  
MAINTENANCE MANUAL

**B. Install Pneumatic Thermostat**

- (1) Make certain APU control circuit breaker located on battery bus section of circuit breaker panel is open and tagged.
- (2) Select correct amount and thickness of shim washers, as removed, to obtain 0.010 to 0.020-inch pinch fit between thermostat mounting flange and turbine plenum flange.
- (3) Install selected shim washers and thermostat.
- (4) Coat thermostat attaching bolt threads with compound (Fel-Pro C-5A).
- (5) Install thermostat attaching bolt and washer. Tighten bolt to torque of 50 to 60 inch-pounds.
- (6) Connect bleed control air line to thermostat.

**CAUTION:** HOLD THERMOSTAT HEX FITTING WITH WRENCH TO PREVENT THERMOSTAT COLLAR FROM ROTATING WHEN CONNECTING BLEED CONTROL AIR LINE OR THERMOSTAT SETTING COULD CHANGE AND POSSIBLY CREATE AN OVERTEMPERATURE CONDITION.

- R (7) Install APU engine housing aft cover. (See Overhaul Manual, Chapter  
R 49-00-1).
- (8) Remove tag and close APU control circuit breaker located on battery bus section of circuit breaker panel.
  - (9) To perform functional test or make necessary adjustment to pneumatic thermostat, see 49-00, Adjustment/Test.



DOUGLAS AIRCRAFT CO., INC.  
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THREE-WAY SOLENOID SHUTOFF VALVE - MAINTENANCE PRACTICES

1. General

- A. The three-way solenoid shutoff valve is mounted on a bracket located on the turbine plenum flange at approximately the 11 o'clock position. Access to the shutoff valve is through the APU engine housing upper section.

**WARNING:** MAKE CERTAIN APU HAS COOLED SUFFICIENTLY AFTER SHUTDOWN TO PERMIT SKIN CONTACT. MAKE CERTAIN APU BATTERY SWITCH IN FLIGHT COMPARTMENT IS IN OFF POSITION.

2. Removal/Installation Three-Way Solenoid Shutoff Valve

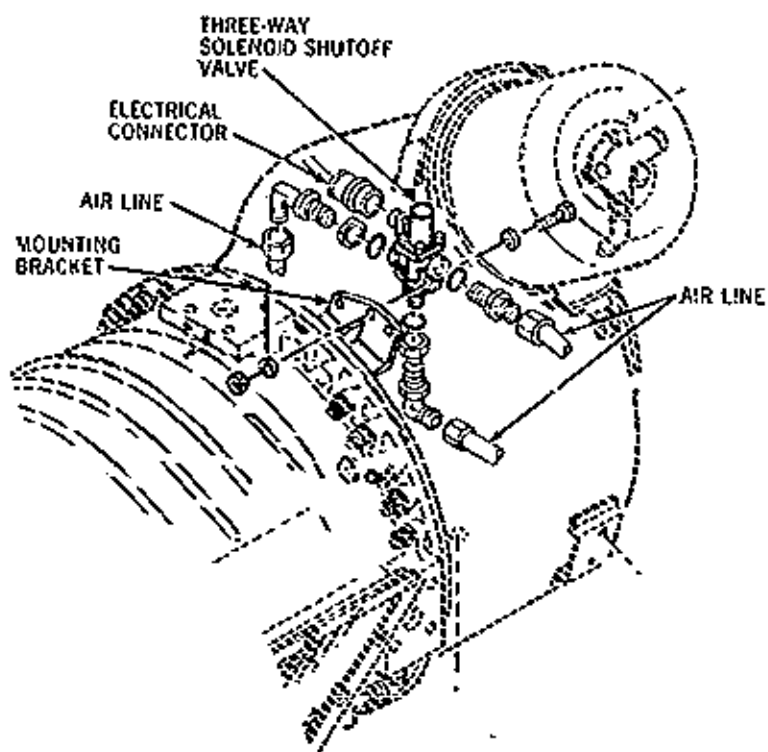
A. Remove Solenoid Shutoff Valve

- (1) Open and tag APU control circuit breaker located on battery bus section of circuit breaker panel.
- R (2) Remove APU engine housing upper section (see Overhaul Manual, Chapter  
R 49-00-1).
- (3) Disconnect electrical connector from solenoid valve.
- (4) Disconnect air lines from solenoid valve.
- (5) Remove solenoid valve attaching bolts, washers and nuts.
- (6) Remove solenoid valve.

B. Install Solenoid Shutoff Valve

- (1) Make certain APU control circuit breaker located on battery bus section of circuit breaker panel is open and tagged.
- (2) Position solenoid valve on mounting bracket and install attaching bolts, washers and nuts. Tighten bolts to torque of 20 to 25 inch-pounds.
- (3) Connect air lines to solenoid valve.
- (4) Connect electrical connector to solenoid valve.
- R (5) Install APU engine housing upper section (see Overhaul Manual, Chapter  
R 49-00-1).
- (6) Remove tag and close APU control circuit breaker located on battery bus section of circuit breaker panel.

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HA2-8807

Three-Way Solenoid Shutoff Valve - Removal/Installation  
Figure 201

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**DC-8 SEVENTY SERIES**  
MAINTENANCE MANUAL

DROPPER DUCT - MAINTENANCE PRACTICES

1. General

- A. The dropper duct consists of two flexible hose sections and a solid duct section installed between fuselage stations 550 and 590. Removal/installation procedure for the left and right dropper ducts are identical.

2. Removal/Installation Dropper Duct

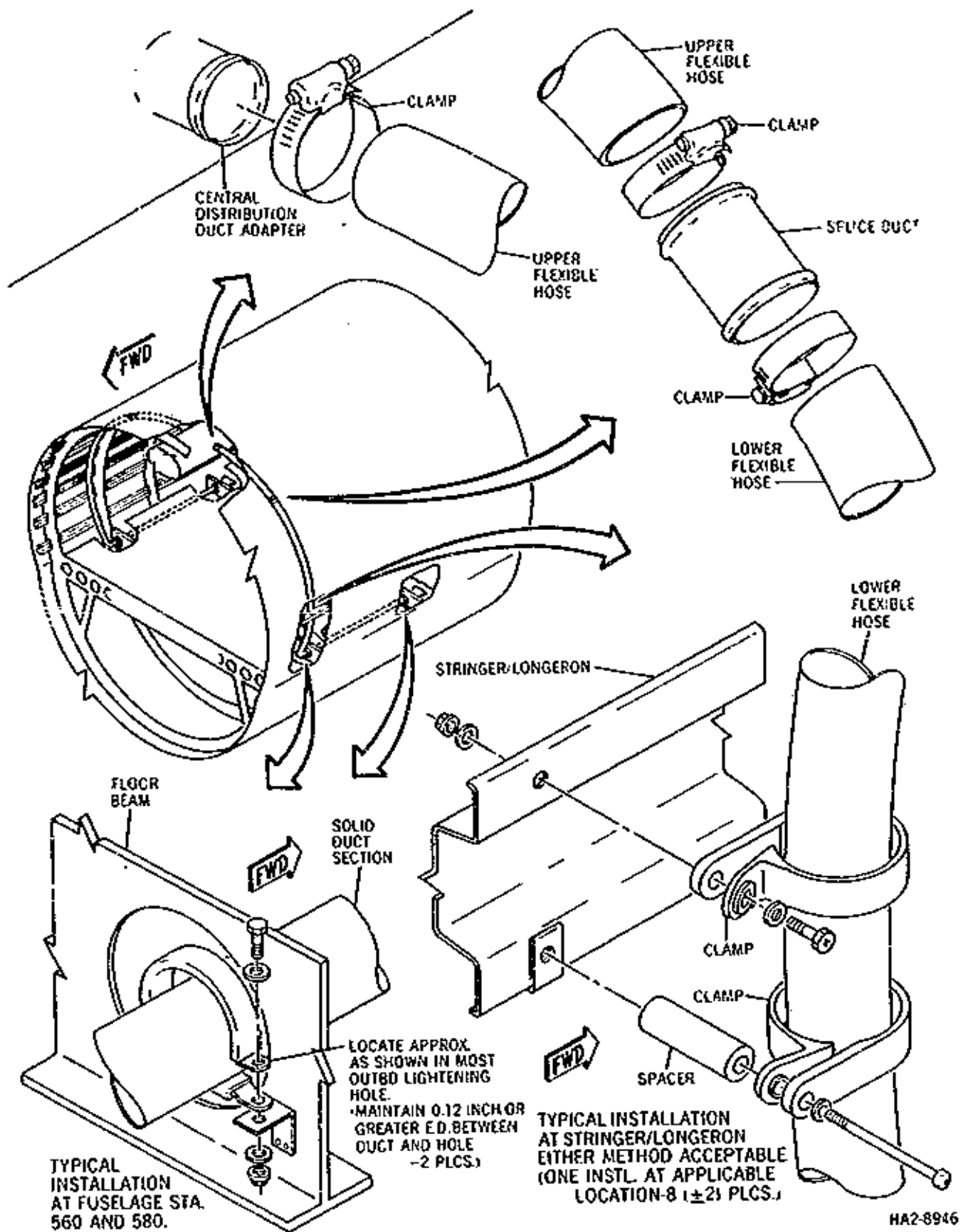
A. Remove Duct

- (1) Remove cabin panels as necessary.
- (2) Remove clamp connecting solid duct section to lower flexible hose section.
- (3) Remove clamps, bolts, washers, and nuts securing solid duct section to floor beams.
- (4) Remove solid duct section.
- (5) Remove clamp connecting lower flexible duct section to splice duct.
- (6) Remove clamps, spacers, bolts, screws, washers, and nuts securing lower flexible hose section to stringers/longerons.
- (7) Remove lower flexible hose section.
- (8) Remove clamp connecting splice duct to upper flexible hose section and remove splice duct.
- (9) Remove clamp connecting upper flexible hose section to central distribution duct adapter.
- (10) Remove upper flexible hose section.

B. Install Duct

- (1) Slip end of upper flexible hose over central distribution duct adapter and install connecting clamp.
- (2) Insert splice duct into lower end of upper flexible hose and install connecting clamp.
- (3) Slip end of lower flexible hose over splice duct and install connecting clamp.

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Dropper Duct -- Removal/Installation  
 Figure 201

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MAINTENANCE MANUAL

- (4) Secure flexible hose to stringers/longerons with clamps, spacers, bolts, screws, washers, and nuts.
- (5) Insert solid duct section thru lightening holes of floor beams at fuselage stations 560 and 580.
- (6) Slip end of lower flexible hose over end of solid duct section and install connecting clamp.
- (7) Secure solid duct section to floor beams with clamps, bolts, washers, and nuts. Maintain proper edge distance between lightening holes and duct.
- (8) Install cabin panels.

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MAINTENANCE MANUAL

CENTRIFUGAL SWITCH - MAINTENANCE PRACTICES

1. General

- A. The centrifugal switch is mounted on the accessory gearcase. Access to the switch is through the APU housing fwd cover.

WARNING: MAKE CERTAIN APU HAS COOLED SUFFICIENTLY AFTER SHUTDOWN TO PERMIT SKIN CONTACT. MAKE CERTAIN APU BATTERY SWITCH ON FLIGHT ENGINEER'S PANEL IS IN OFF POSITION.

2. Tools and Equipment Required

NOTE: Equivalent substitutes may be used instead of the following items.

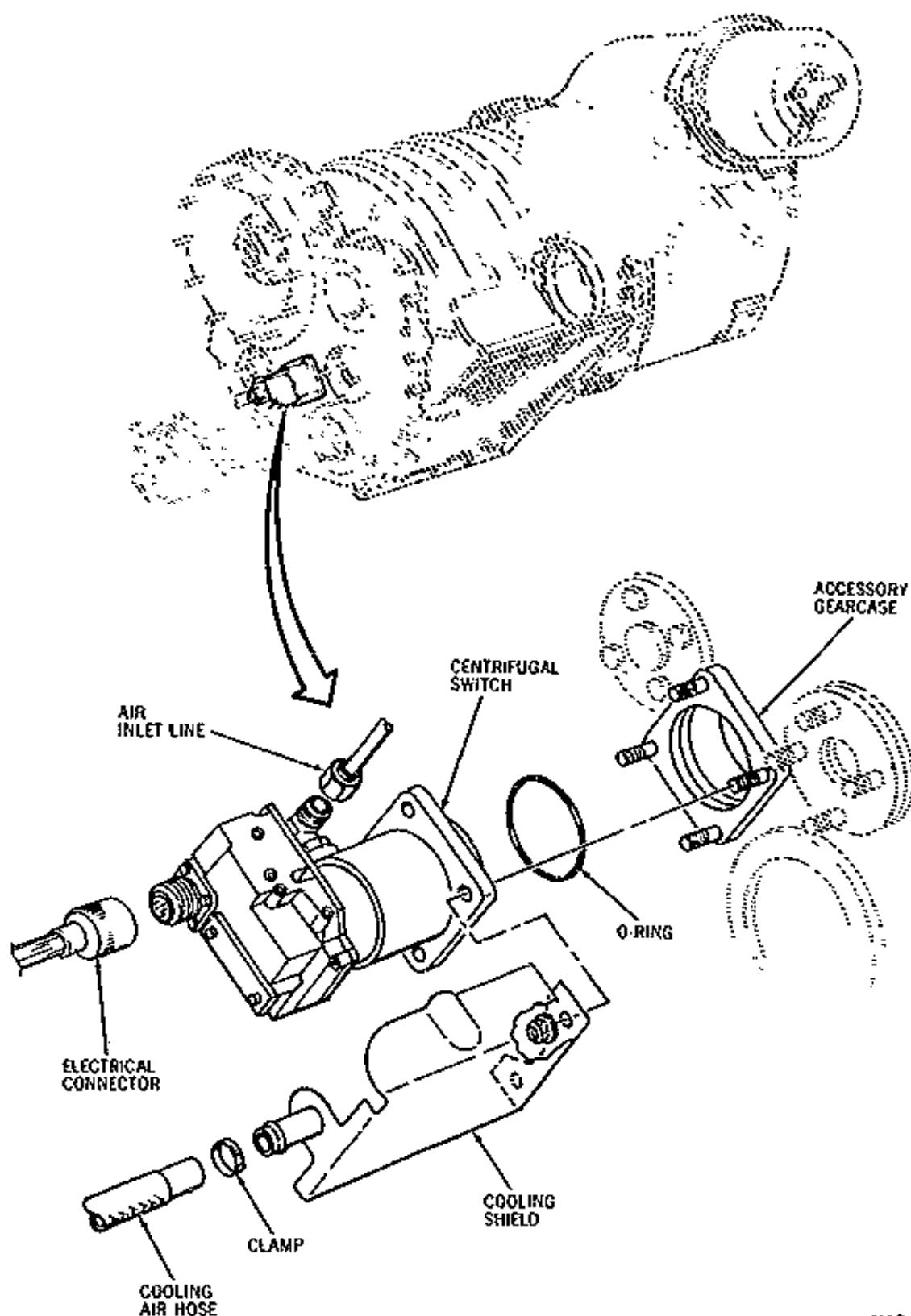
<u>Item</u>	<u>Name</u>	<u>Number</u>	<u>Manufacturers</u>	<u>Use</u>
A	Torque wrench	0 - 150 inch-pounds		To tighten centrifugal switch attaching nuts to proper torque
B	Grease (MIL-G-21164)	Mobil 29 or Royco 13D	Mobil Chemical Co. Royal Lubricants Co.	To lubricate centrifugal switch drive shaft splines
C.	Oil	MIL-L-7808 or MIL-L-23699A	Commercially available	To lubricate centrifugal switch O-ring

3. Removal/Installation Centrifugal Switch

A. Remove Switch (See Figure 201)

- (1) Open and tag APU control circuit breaker located on battery bus section of circuit breaker panel.
- R (2) Remove APU engine housing fwd cover (see Overhaul Manual, Chapter  
R 49-00-1).
- (3) Disconnect switch electrical connector.
- (4) Disconnect switch air inlet line.
- R (4a) Disconnect switch cooling air hose from switch cooling shield.
- (5) Remove switch attaching nuts.
- R (5a) Remove switch cooling shield.
- (6) Carefully withdraw switch (in a straight line) from accessory gearcase mounting pad. Remove and discard O-ring.

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MAINTENANCE MANUAL



HA2-8817A

Centrifugal Switch -- Removal/Installation  
Figure 201

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**DC-8 SEVENTY SERIES**  
MAINTENANCE MANUAL

**B. Install Switch**

- (1) Make certain APU control circuit breaker located on battery bus section of circuit breaker panel is open and tagged.
- (2) Lightly coat new O-ring with oil (MIL-L-7808 or MIL-L-23699A), and install on switch.
- (3) Lightly lubricate splines of accessory drive gear shaft with grease (Mobil 29 or Royco 13D).
- (4) Carefully install switch on mounting pad, ensuring that switch drive shaft splines engage accessory drive shaft splines.
- R (4a) Position cooling shield on switch mounting pad.
- (5) Install switch attaching nuts, and tighten to torque of 70 to 90 inch-pounds.
- (6) Connect switch electrical connector.
- (7) Connect switch air inlet line.
- R (7a) Connect switch cooling air hose to cooling shield.
- R (8) Install APU housing fwd cover (see Overhaul Manual, Chapter 49-00-1).
- (9) Remove tag and close APU control circuit breaker located on battery bus section of circuit breaker panel.
- (10) Perform operation check of all switch actuations (see 49-00, Adjustment/Test).



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MAINTENANCE MANUAL

SEQUENCING OIL PRESSURE SWITCH - MAINTENANCE PRACTICES

1. General

- A. The sequencing oil pressure switch is clamp-mounted to a bracket installed on the oil pump flange. Access to the switch is through the APU housing fwd cover.

WARNING: MAKE CERTAIN APU HAS COOLED SUFFICIENTLY AFTER SHUTDOWN TO PERMIT SKIN CONTACT. MAKE CERTAIN APU BATTERY SWITCH ON FLIGHT ENGINEER'S PANEL IS IN OFF POSITION.

2. Removal/Installation Sequencing Oil Pressure Switch

A. Remove Switch (See Figure 201)

- (1) Open and tag APU control circuit breaker located on battery bus section of circuit breaker panel.
- R (2) Remove APU housing fwd cover (see Overhaul Manual, Chapter 49-00-1).
- (3) Disconnect switch electrical connector.
- (4) Disconnect oil line from tee on bottom of switch.

NOTE: Position suitable container to catch residual in line or switch.

- (5) Loosen clamp and remove switch and clamp from mounting bracket.
- (6) Remove tee from switch. Remove and discard O-ring.

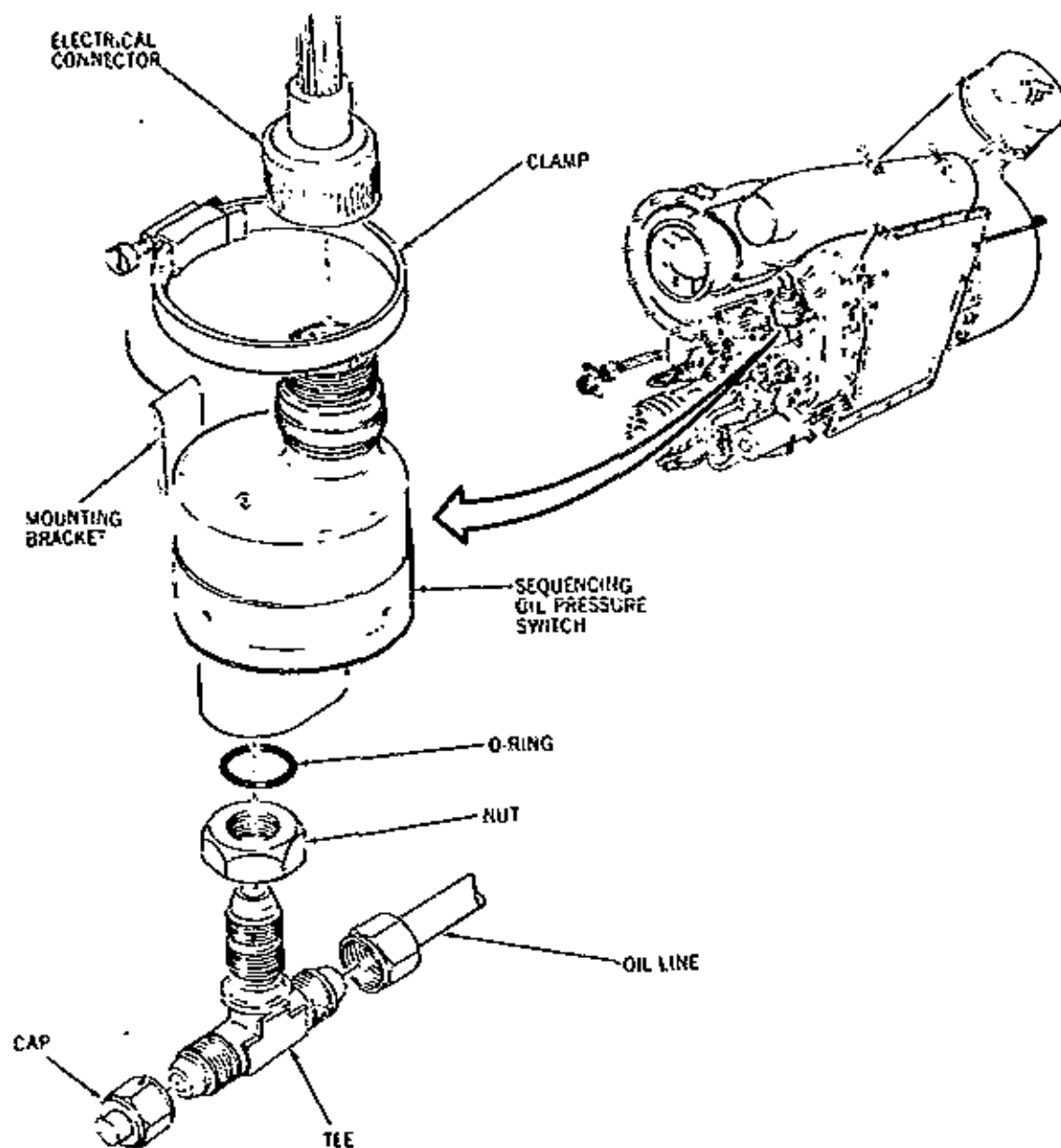
B. Install Switch

- (1) Make certain APU control circuit breaker located on battery bus section of circuit breaker panel is open and tagged.
- (2) Install new O-ring on tee.
- (3) Install tee on switch.
- (4) Position switch on mounting bracket and install clamp.

CAUTION: MAKE CERTAIN CLAMP DOES NOT COVER VENT HOLES IN SWITCH HOUSING.

- (5) Connect oil line to tee on bottom of switch.
- (6) Connect switch electrical connector.

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MAINTENANCE MANUAL



HA2-8818

Sequencing Oil Pressure Switch -- Removal/Installation  
Figure 201

DOUGLAS AIRCRAFT CO., INC.  
**DC-8 SEVENTY SERIES**  
MAINTENANCE MANUAL

- R (7) Install APU housing fwd cover (see Overhaul Manual, Chapter 49-00-1).
- (8) Remove tag and close APU control circuit breaker located on battery bus section of circuit breaker panel.

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**DC-8 SEVENTY SERIES**  
MAINTENANCE MANUAL

PNEUMATIC SOLENOID VALVE - MAINTENANCE PRACTICES

1. General

- A. The pneumatic solenoid valve is mounted on a bracket located on the accessory gearcase. Access to the solenoid valve is through the APU housing fwd cover.

WARNING: MAKE CERTAIN APU HAS COOLED SUFFICIENTLY AFTER SHUTDOWN TO PERMIT SKIN CONTACT. MAKE CERTAIN APU BATTERY SWITCH ON FLIGHT ENGINEER'S PANEL IS IN OFF POSITION.

2. Removal/Installation Pneumatic Solenoid Valve

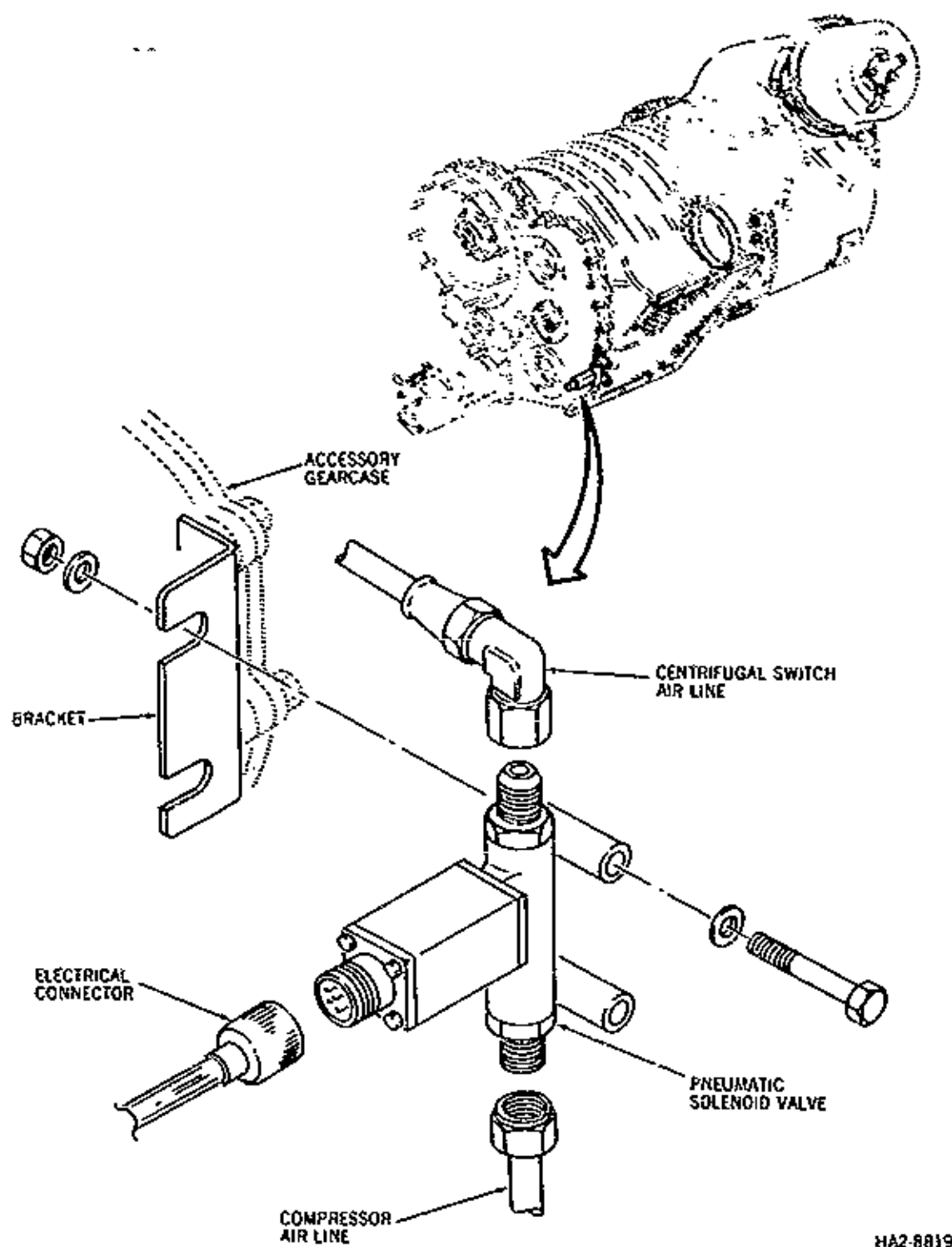
A. Remove Solenoid Valve

- (1) Open and tag APU control circuit breaker located on battery bus section of circuit breaker panel.
- (2) Remove APU housing fwd cover (see Overhaul Manual, Chapter 49-00-1).
- (3) Disconnect solenoid valve electrical connector.
- (4) Disconnect solenoid valve compressor air line.
- (5) Disconnect solenoid valve centrifugal switch air line.
- (6) Remove solenoid valve attaching bolts, washers and nuts.
- (7) Remove solenoid valve.

B. Install Solenoid Valve

- (1) Make certain APU control circuit breaker located on battery bus section of circuit breaker panel is open and tagged.
- (2) Position solenoid valve on mounting bracket and install attaching bolts, washers and nuts. Tighten bolts to torque of 20 to 25 inch-pounds.
- (3) Connect solenoid valve compressor air line.
- (4) Connect solenoid valve centrifugal switch air line.
- (5) Connect solenoid valve electrical connector.
- (6) Install APU housing fwd cover (see Overhaul Manual, Chapter 49-00-1).
- (7) Remove tag and close APU control circuit breaker located on battery bus section of circuit breaker panel.

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Pneumatic Solenoid Valve - Removal/Installation  
Figure 201

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**DC-8 SEVENTY SERIES**  
MAINTENANCE MANUAL

HOURMETER - MAINTENANCE PRACTICES

1. General

- A. The hourmeter and shockmount is mounted on a bracket located on the accessory cooling air fan. Access to the hourmeter is through the APU engine housing fwd cover.

WARNING: MAKE CERTAIN APU HAS COOLED SUFFICIENTLY AFTER SHUTDOWN TO PERMIT SKIN CONTACT. MAKE CERTAIN APU BATTERY SWITCH ON FLIGHT ENGINEER'S PANEL IS IN OFF POSITION.

2. Removal/Installation Hourmeter

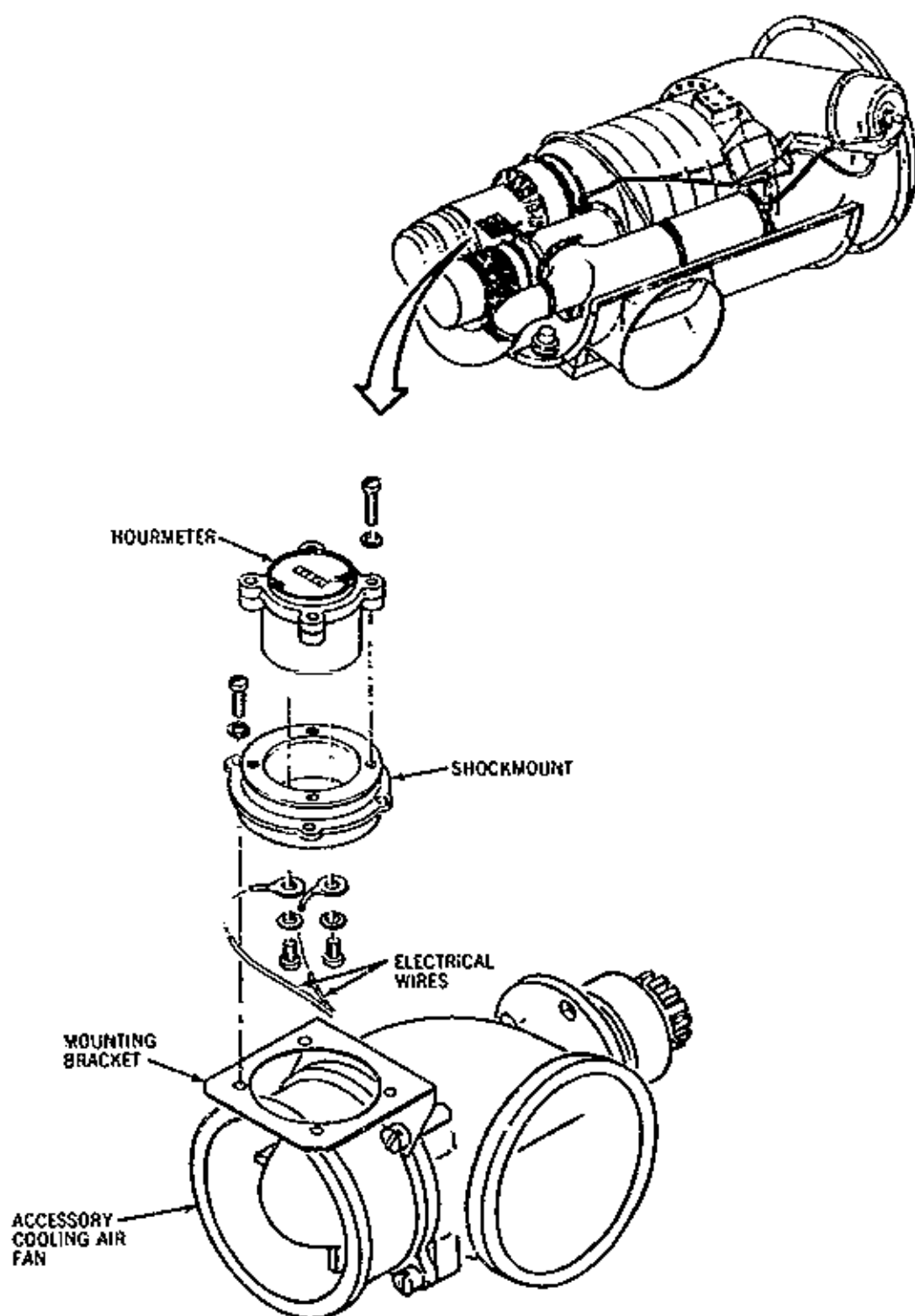
A. Remove Hourmeter

- (1) Open and tag APU control circuit breaker located on battery bus section of circuit breaker panel.
- R (2) Remove APU engine housing fwd cover (see Overhaul Manual, Chapter  
R 49-00-1).
- (3) Record total APU operating time and date.
- (4) Remove screws attaching hourmeter to shockmount.
- (5) Carefully lift hourmeter out of shockmount and disconnect electrical wires.
- (6) Remove hourmeter from shockmount.
- (7) Remove screws attaching shockmount to mounting bracket and remove shockmount.

B. Install Hourmeter

- (1) Make certain APU control circuit breaker located on battery bus section of circuit breaker panel is open and tagged.
- (2) Position hourmeter in shockmount and connect electrical wires.
- (3) Install hourmeter attaching screws.
- (4) Position hourmeter and shockmount on mounting bracket.
- (5) Install shockmount attaching screws.
- R (6) Install APU engine housing fwd cover (see Overhaul Manual, Chapter  
R 49-00-1).
- (7) Remove tag and close APU control circuit breaker located on battery bus section of circuit breaker panel.

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MAINTENANCE MANUAL



HA2-8808

Hourmeter -- Removal/Installation  
Figure 201

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**DC-8 SEVENTY SERIES**  
MAINTENANCE MANUAL

EXHAUST GAS TEMPERATURE INDICATOR - MAINTENANCE PRACTICES

1. General

- A. The exhaust gas temperature indicator is mounted on the flight engineer's APU control panel in the flight compartment.

CAUTION: MAKE CERTAIN INDICATOR HAS BEEN CALIBRATED BEFORE INSTALLATION.

2. Removal/Installation Exhaust Gas Temperature Indicator

A. Remove Indicator

- (1) Open and tag APU control circuit breaker located on battery bus section of circuit breaker panel.
- (2) Loosen indicator mounting clamp.
- (3) Carefully pull indicator clear of panel.
- (4) Disconnect indicator electrical connector.

B. Install Indicator

- (1) Make certain APU control circuit breaker located on battery bus section of circuit breaker panel is open and tagged.
- (2) Connect indicator electrical connector.
- (3) Carefully insert indicator into panel.
- (4) Tighten indicator mounting clamp.

CAUTION: DO NOT OVERTIGHTEN INDICATOR MOUNTING CLAMP OR DAMAGE TO INDICATOR COULD RESULT.

- (5) Remove tag and close APU control circuit breaker located on battery bus section of circuit breaker panel.



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EXHAUST GAS TEMPERATURE THERMOCOUPLE - MAINTENANCE PRACTICES

1. General

- A. The exhaust gas temperature (EGT) thermocouple is mounted at approximately the 7 o'clock position on the APU plenum exhaust duct flange with the thermocouple body extending into the exhaust path. Access to the thermocouple is through the APU engine housing exhaust dome.

WARNING: MAKE CERTAIN APU HAS COOLED SUFFICIENTLY AFTER SHUTDOWN TO PERMIT SKIN CONTACT. MAKE CERTAIN APU BATTERY SWITCH LOCATED IN FLIGHT COMPARTMENT IS IN OFF POSITION.

2. Tools and Equipment Required

NOTE: Equivalent substitutes may be used instead of the following item.

<u>Item</u>	<u>Name</u>	<u>Number</u>	<u>Manufacturer</u>	<u>Use</u>
A	Compound, High Temp.	Fel-Pro C5-A	Fel-Pro Inc., Div of Felt Products Mfg Co. 7450 N. McCormick Bl. Skokie, IL 60076	To coat thermo- couple attaching bolt threads

3. Removal/Installation EGT Thermocouple

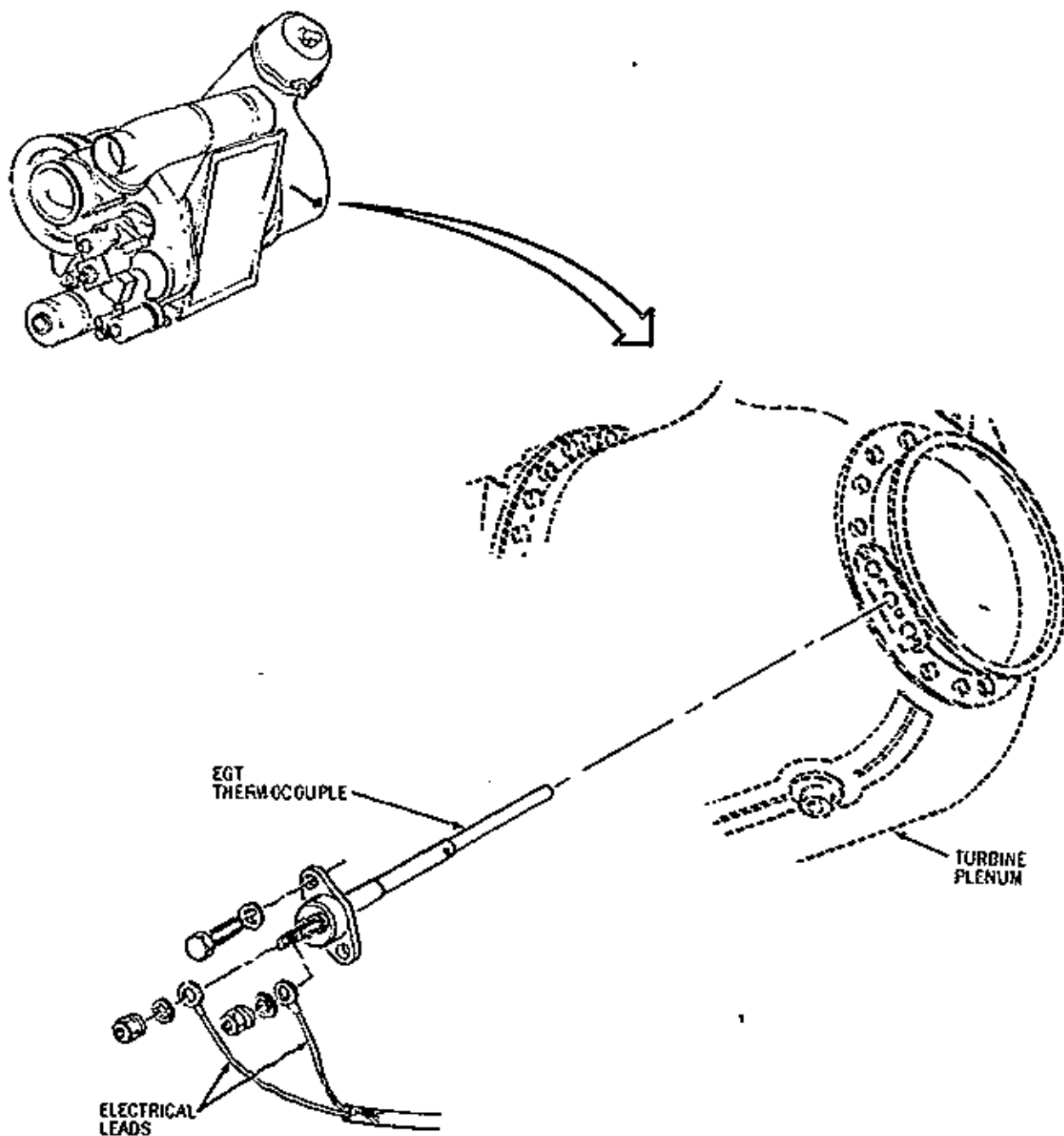
A. Remove Thermocouple

- (1) Open and tag APU control circuit breaker located on battery bus section of circuit breaker panel.
- R (2) Remove APU engine housing aft cover (see Overhaul Manual, Chapter  
R 49-00-1).
- (3) Tag and disconnect thermocouple electrical leads.
- (4) Remove thermocouple attaching bolts.
- (5) Carefully withdraw thermocouple from flange mounting boss.

B. Install Thermocouple

- (1) Make certain APU control circuit breaker located on battery bus section of circuit breaker panel is open and tagged.
- (2) Carefully insert thermocouple body into flange mounting boss and align holes in mounting flange with holes in mounting boss.

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**DC-8 SEVENTY SERIES**  
MAINTENANCE MANUAL



HA2-8809

EGT Thermocouple -- Removal/Installation  
Figure 201

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**DC-8 SEVENTY SERIES**  
MAINTENANCE MANUAL

- (3) Apply compound (Fel-Pro C5-A) to threads of thermocouple attaching bolts.
- (4) Install thermocouple attaching bolts. Tighten bolts to torque of 50 to 70 inch-pounds.
- (5) Remove tags and connect thermocouple electrical leads.

CAUTION: DO NOT EXCEED TORQUE OF 25 INCH-POUNDS WHEN TIGHTENING  
AL TERMINAL NUT. AND 15 INCH-POUNDS WHEN TIGHTENING  
CR TERMINAL NUT.

R  
R

- (6) Install APU engine housing aft cover (see Overhaul Manual, Chapter 49-00-1).
- (7) Remove tag and close APU control circuit breaker located on battery bus section of circuit breaker panel.

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MAINTENANCE MANUAL

TACHOMETER GENERATOR - MAINTENANCE PRACTICES

1. General

- A. The tachometer generator is mounted on the oil pump located on the left side of the accessory drive gearcase. Access to the tachometer generator is through the APU engine housing fwd cover.

**WARNING:** MAKE CERTAIN APU HAS COOLED SUFFICIENTLY AFTER SHUTDOWN TO PERMIT SKIN CONTACT. MAKE CERTAIN APU BATTERY SWITCH LOCATED IN FLIGHT COMPARTMENT IS IN OFF POSITION.

2. Removal/Installation Tachometer Generator

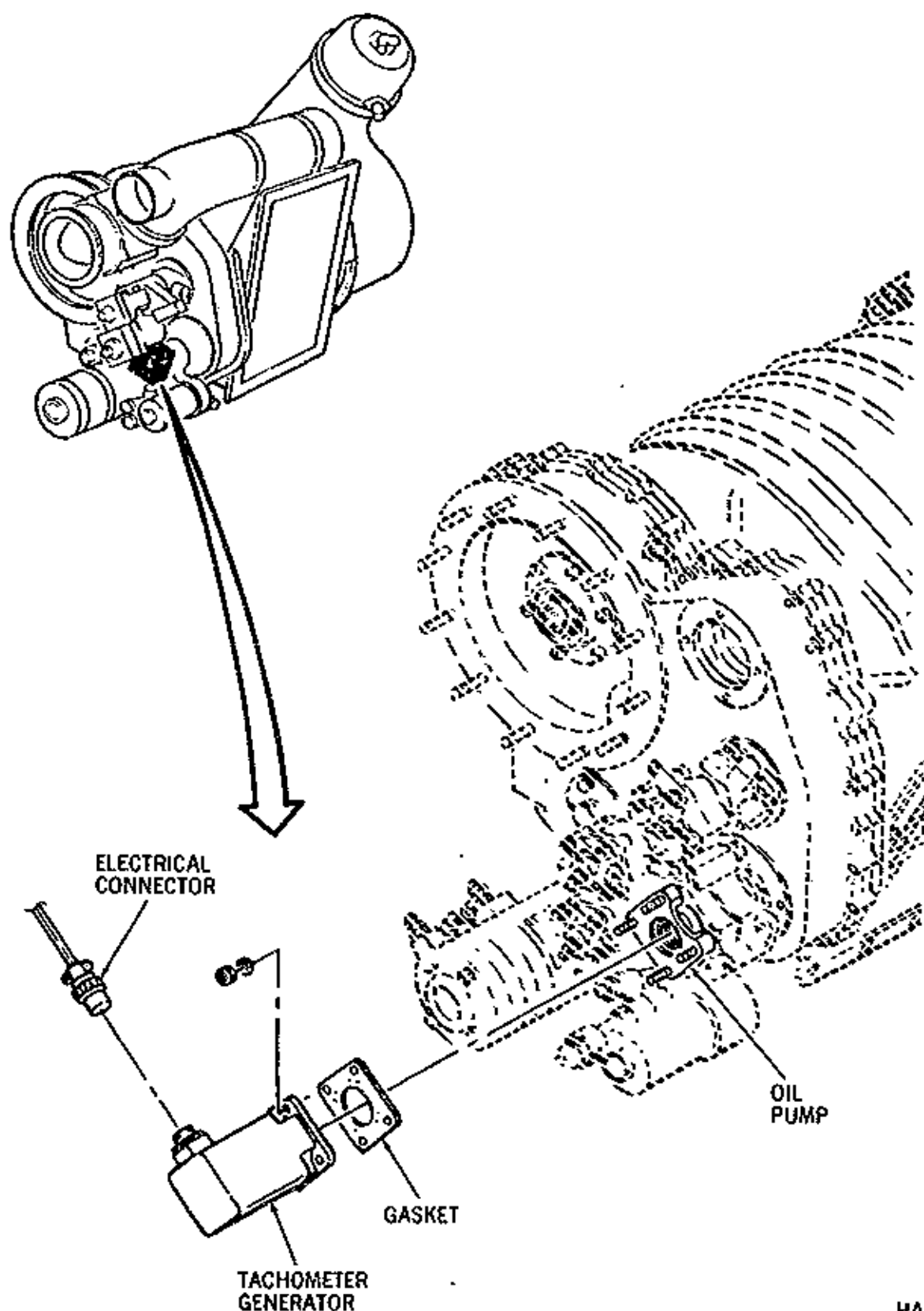
A. Remove Tachometer Generator

- (1) Open and tag APU control circuit breaker located on battery bus section of circuit breaker panel.
- R (2) Remove APU engine housing fwd cover (see Overhaul Manual, Chapter  
R 49-00-1).
- (3) Disconnect tachometer generator electrical connector.
- (4) Remove tachometer generator attaching nuts and washers.
- (5) Carefully disengage tachometer generator splined shaft from mating splines of accessory drive and remove generator.
- (6) Remove and discard gasket.

B. Install Tachometer Generator

- (1) Make certain APU control circuit breaker located on battery bus section of circuit breaker panel is open and tagged.
- (2) Install new gasket on tachometer generator mounting pad.
- (3) Position tachometer generator on mounting pad and carefully engage drive shaft splines with mating splines of accessory gear drive.
- (4) Install tachometer generator attaching nuts and washers. Tighten nuts to torque of 70 to 90 inch-pounds.

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Tachometer Generator -- Removal/Installation  
Figure 201

HA2-8810

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**DC-8 SEVENTY SERIES**  
MAINTENANCE MANUAL

TACHOMETER INDICATOR - MAINTENANCE PRACTICES

1. General

- A. The tachometer indicator is mounted on the APU control panel in the flight compartment.

2. Removal/Installation Tachometer Indicator

A. Remove Indicator

- (1) Open and tag APU control circuit breaker located on battery bus section of circuit breaker panel.
- (2) Loosen indicator mounting clamp.
- (3) Carefully pull indicator out of panel.
- (4) Disconnect indicator electrical connector.

B. Install Indicator

- (1) Make certain APU control circuit breaker located on battery bus section of circuit breaker panel is open and tagged.
- (2) Connect indicator electrical connector.
- (3) Carefully insert indicator into panel.
- (4) Tighten indicator mounting clamp.

**CAUTION:** DO NOT OVERTIGHTEN INDICATOR MOUNTING CLAMP  
OR DAMAGE TO INDICATOR COULD RESULT.

- (5) Remove tag and close APU control circuit breaker located on battery bus section of circuit breaker panel.

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MAINTENANCE MANUAL

EXHAUST DUCTS AND EDUCTOR - MAINTENANCE PRACTICES

1. General

- A. The exhaust system consists of a straight duct, an eductor, and two elbow ducts installed between the APU engine housing module exhaust outlet and the exhaust port located on the side of the fuselage between stations 560.0 and 580.0.
- B. The exhaust ducts and eductor are located and accessible from within the forward cargo compartment. Removal/installation procedures for the left and right (if installed) exhaust ducts and eductor are identical.

WARNING: MAKE CERTAIN EXHAUST DUCTS AND EDUCTOR HAVE COOLED SUFFICIENTLY AFTER APU SHUTDOWN TO PERMIT SKIN CONTACT. MAKE CERTAIN BATTERY SWITCH IN FLIGHT COMPARTMENT IS IN OFF POSITION.

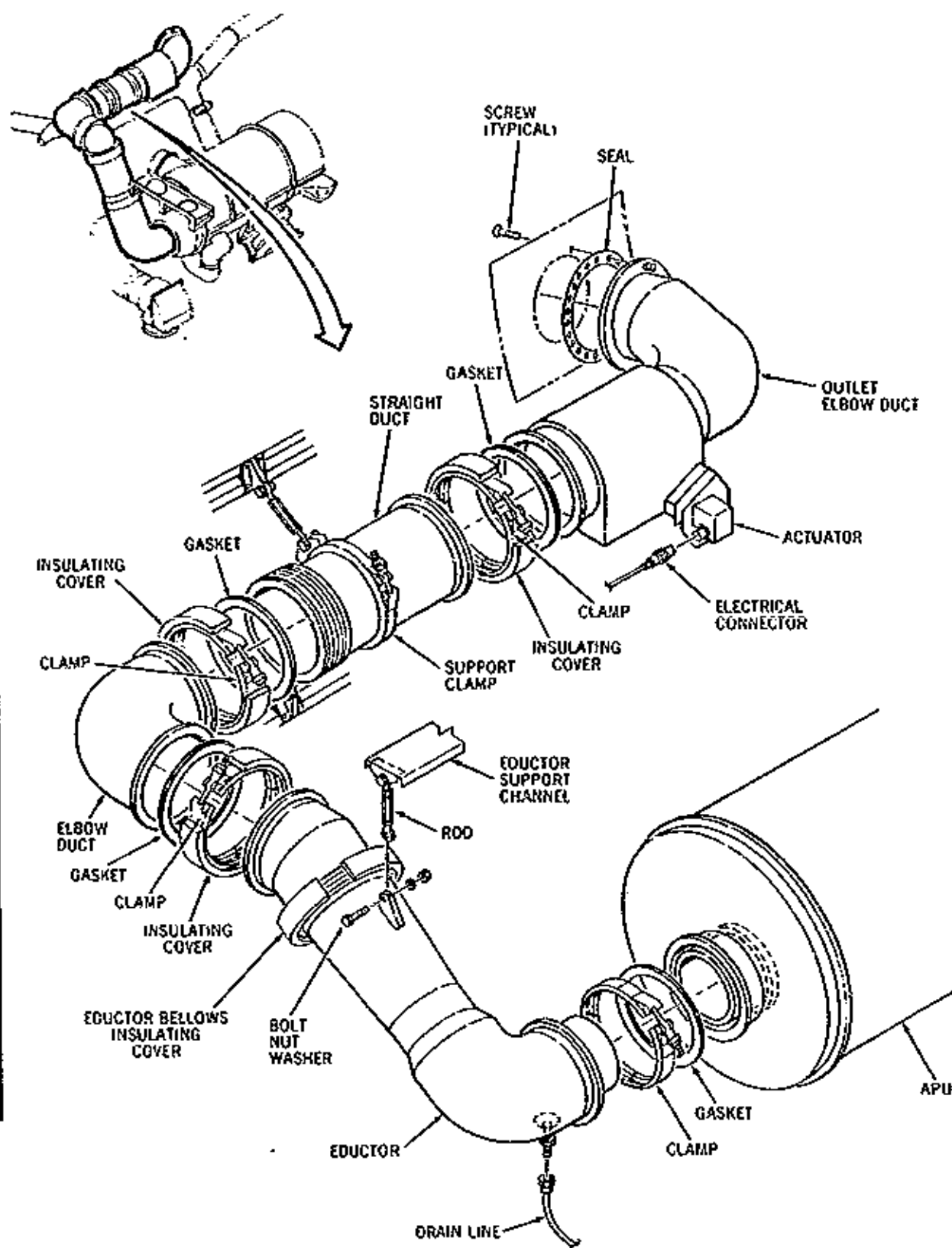
CAUTION: USE EXTREME CARE WHEN HANDLING EXHAUST DUCTS AND EDUCTOR TO PREVENT DAMAGE. DENTS IN DUCTS OR EDUCTOR COULD IMPEDE GAS FLOW AND RESULT IN HOT SPOTS OR DUCT AND/OR EDUCTOR FAILURE.

2. Removal/Installation Exhaust Ducts and Eductor

A. Remove Exhaust Ducts and Eductor (See Figure 201)

- (1) Open and tag APU control circuit breaker located on battery bus section of circuit breaker panel.
- (2) Disconnect outlet elbow duct door actuator electrical connector.
- (3) Disconnect electrical wires from outlet elbow duct door actuator position switches.
- (4) Remove screws attaching outlet elbow duct flange to fuselage exhaust port.
- (4a) Remove insulating cover installed over outlet elbow duct and straight duct connecting clamp.
- (5) Remove clamp connecting outlet elbow duct to straight duct and remove elbow duct. Discard end gasket.
- (6) Remove and discard exhaust port seal.
- (7) Disconnect straight duct support clamp.
- (7a) Remove insulating cover installed over straight duct and elbow duct connecting clamp.

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 MAINTENANCE MANUAL



Exhaust Ducts and Eductor -- Removal/Installation  
 Figure 201

HA2-88118



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**DC-8 SEVENTY SERIES**  
MAINTENANCE MANUAL

- R (8) Remove clamp connecting straight duct to elbow duct and remove straight duct. Discard end gasket.
- (8a) Remove insulating cover installed over elbow duct and eductor connecting clamp.
- R (9) Remove clamp connecting elbow duct to eductor and remove elbow duct. Discard end gasket.
- (10) Remove eductor support rod link bolt.
- (11) Disconnect eductor drain line.
- (12) Remove clamp connecting eductor to APU engine housing module exhaust adapter.
- R (13) Slide end of eductor off APU engine exhaust duct adapter and remove eductor. Discard end gasket.
- (14) Remove eductor bellows insulating cover.

**B. Install Exhaust Ducts and Eductor**

- (1) Make certain APU control circuit breaker located on battery bus section of circuit breaker is open and tagged.
- (1a) Install eductor bellows insulating cover.
- R (1b) Install end gasket on end of eductor.
- R (2) Slide end of eductor over APU engine exhaust duct adapter, position eductor flange on engine housing module exhaust adapter flange, with gasket between flanges, and install connecting clamp loosely.
- R (3) Align duct support with bracket on eductor and install link bolt loosely.
- R (4) Align elbow duct flange with eductor flange and install end gasket between flanges. Install connecting clamp loosely.
- R (5) Align straight duct flange with elbow duct flange and install end gasket between flanges. Install connecting clamp loosely.
- (6) Position duct support clamp on straight duct and tighten clamp loosely.
- R (7) Align outlet elbow flange with straight duct flange and install end gasket between flanges. Install connecting clamp loosely.
- R (8) Install fuselage exhaust port seal.
- (9) Align outlet elbow duct flange with fuselage exhaust port and install attaching screws.

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- (10) Check for proper alignment of ducts and eductor.
- (11) Tighten all connecting clamps to torque specified on clamps.
- (12) Tighten eductor support rod link bolt.
- (12a) Tighten straight duct support clamp.
- (12b) Install insulating cover over connecting clamps at following locations:
  - (a) outlet elbow duct and straight duct.
  - (b) straight duct and elbow duct.
  - (c) elbow duct and eductor.
- (13) Connect eductor drain line.
- (14) Connect outlet duct elbow door actuator electrical connector.
- (15) Connect electrical wires to door actuator position switches.
- (16) Remove tag and close APU control circuit breaker located on battery bus section of circuit breaker panel.

R 3. Outlet Duct Elbow Door Stop Switch Adjustment

R A. Adjust Stop Switches

- R (1) Operate actuator and adjust switches for 90 ( $+5$   
R door,  $-0$ ) degrees travel of

R CAUTION: MAKE CERTAIN SWITCHES ARE ADJUSTED TO OBTAIN FULL  
R TRAVEL OF DOOR TO ENSURE SATISFACTORY CLOSURE.

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OIL - TROUBLE SHOOTING

1. General

- A. Trouble shooting procedures for the APU oil system are outlined on Figure 101.
- B. Operators using AiResearch Tester No. 290270-2-1, should refer to 49-00, Adjustment/Test.

2. Tools and Equipment Required

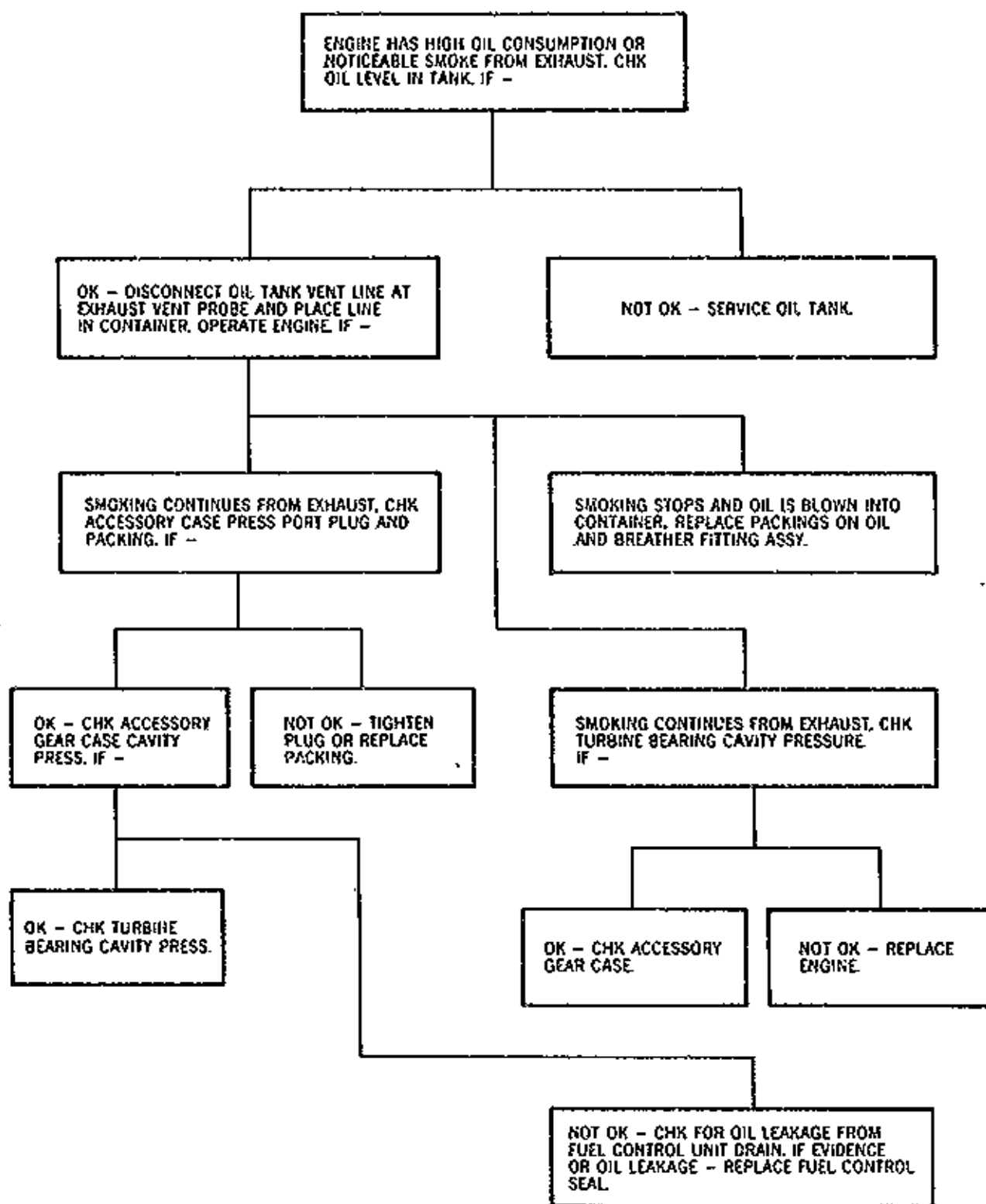
NOTE: Equivalent substitutes may be used instead of the following items:

<u>Item</u>	<u>Name</u>	<u>Number</u>	<u>Manufacturer</u>	<u>Use</u>
A	APU Tester	290270-2-1	AiResearch	For trouble shooting APU
B	APU Tester cable	294131-1-1	AiResearch	For trouble shooting APU

3. Trouble Shooting Oil System

- A. For trouble shooting procedures, refer to Figure 101.

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OIL TANK - MAINTENANCE PRACTICES

1. General

- A. The oil tank is mounted on a bracket located on the forward right side of the APU engine housing at approximately the 5 o'clock position. If a right APU is installed, the oil tank is located on the left side at approximately the 7 o'clock position. The oil tank is accessible from within the forward cargo compartment.

WARNING: MAKE CERTAIN APU HAS COOLED SUFFICIENTLY AFTER SHUTDOWN TO PERMIT SKIN CONTACT. MAKE CERTAIN APU BATTERY SWITCH IN FLIGHT COMPARTMENT IS IN OFF POSITION.

2. Removal/Installation Oil Tank

A. Remove Oil Tank

- (1) Open and tag APU control circuit breaker located on battery bus section of circuit breaker panel.
- (2) Drain oil tank (see 49-00, Servicing).

NOTE: Before proceeding with removal procedures, provide a suitable container to catch oil remaining in lines.

- (3) Disconnect vent in line.
- (4) Disconnect vent out line.
- (5) Disconnect oil out line.
- (6) Disconnect oil in line.

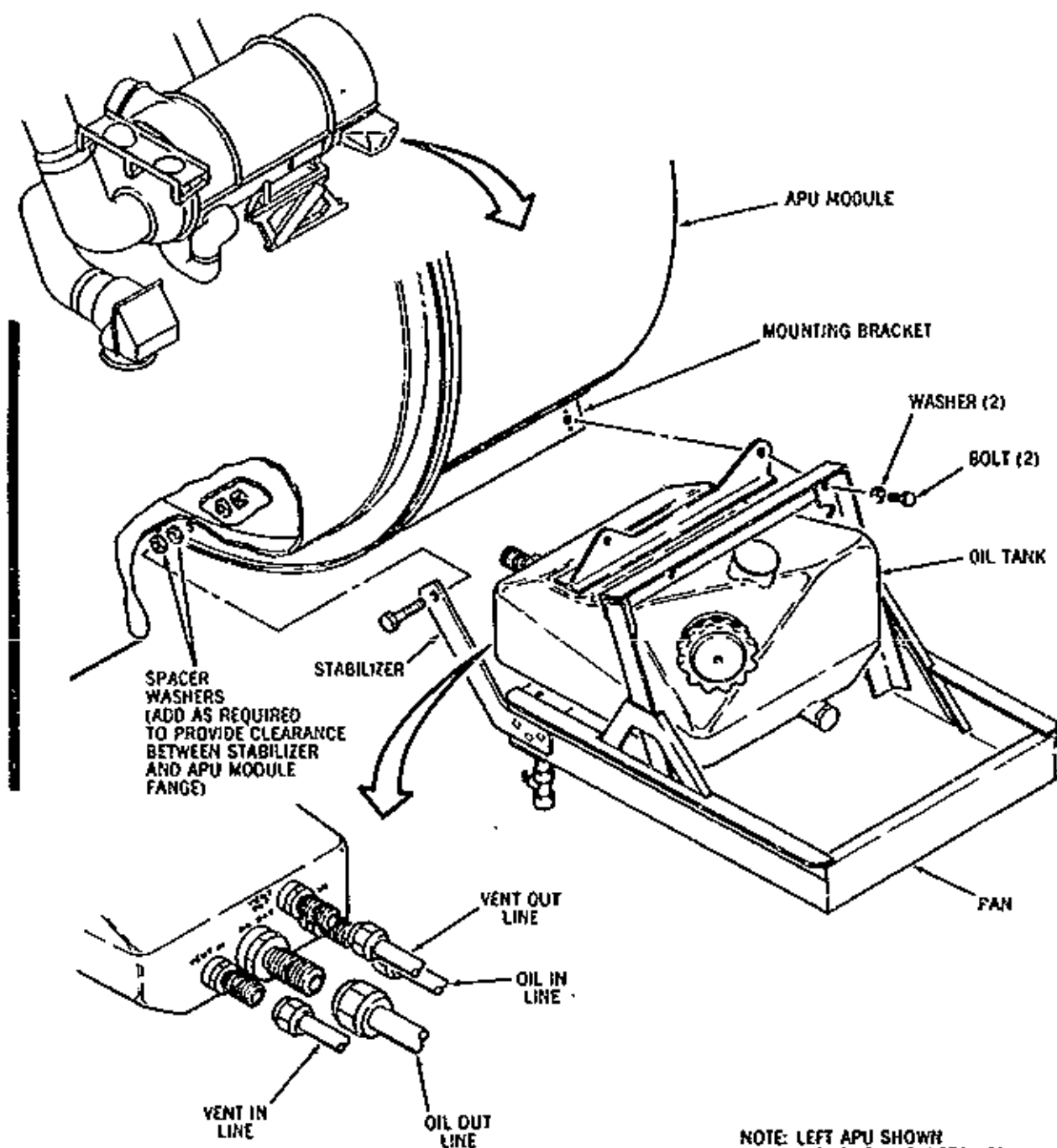
R (6a) Remove oil pan stabilizer attaching bolt, washer, nut and spacer  
R washers.

- (7) Remove oil tank and pan attaching bolts and washers.
- (8) Remove oil tank and pan.

B. Install Oil Tank

- (1) Make certain APU control circuit breaker located on battery bus section of circuit breaker panel is open and tagged.
- (2) Position oil tank and pan on mounting bracket and install attaching bolts and washers.

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NOTE: LEFT APU SHOWN  
RIGHT APU (IF INSTALLED)  
SIMILAR

HA2-8813A

Oil Tank -- Removal/Installation  
Figure 201

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- R (2a) Align oil pan stabilizer bolt hole with mating hole in APU module flange.  
R Install attaching bolt, washer, nut, and spacer washers.

R NOTE: The same amount of spacer washers (as removed) should be  
R installed between stabilizer and APU module flange to  
R maintain proper clearance.

- (3) Connect oil out line.  
(4) Connect oil in line.  
(5) Connect vent in line.  
(6) Connect vent out line.  
(7) Fill oil tank (see Chapter 12).  
(8) Remove tag and close APU control circuit breaker located on battery  
bus section of circuit breaker panel.  
(9) Check oil tank connections and lines for leakage at next engine run.

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OIL COOLER - MAINTENANCE PRACTICES

1. General

- A. The APU oil cooler is mounted on the upper left side of the compressor plenum. Access to the oil cooler is through the APU engine housing upper section.

WARNING: MAKE CERTAIN APU HAS COOLED SUFFICIENTLY AFTER SHUTDOWN TO PERMIT SKIN CONTACT. MAKE CERTAIN APU BATTERY SWITCH IN FLIGHT COMPARTMENT IS IN OFF POSITION.

2. Tools and Equipment Required

NOTE: Equivalent substitutes may be used instead of the following items:

<u>Item</u>	<u>Name</u>	<u>Number</u>	<u>Manufacturer</u>	<u>Use</u>
A	Container	1 US gal. (3.7850 liters)		To catch residual oil in oil cooler lines

3. Removal/Installation Oil Cooler

A. Remove Oil Cooler

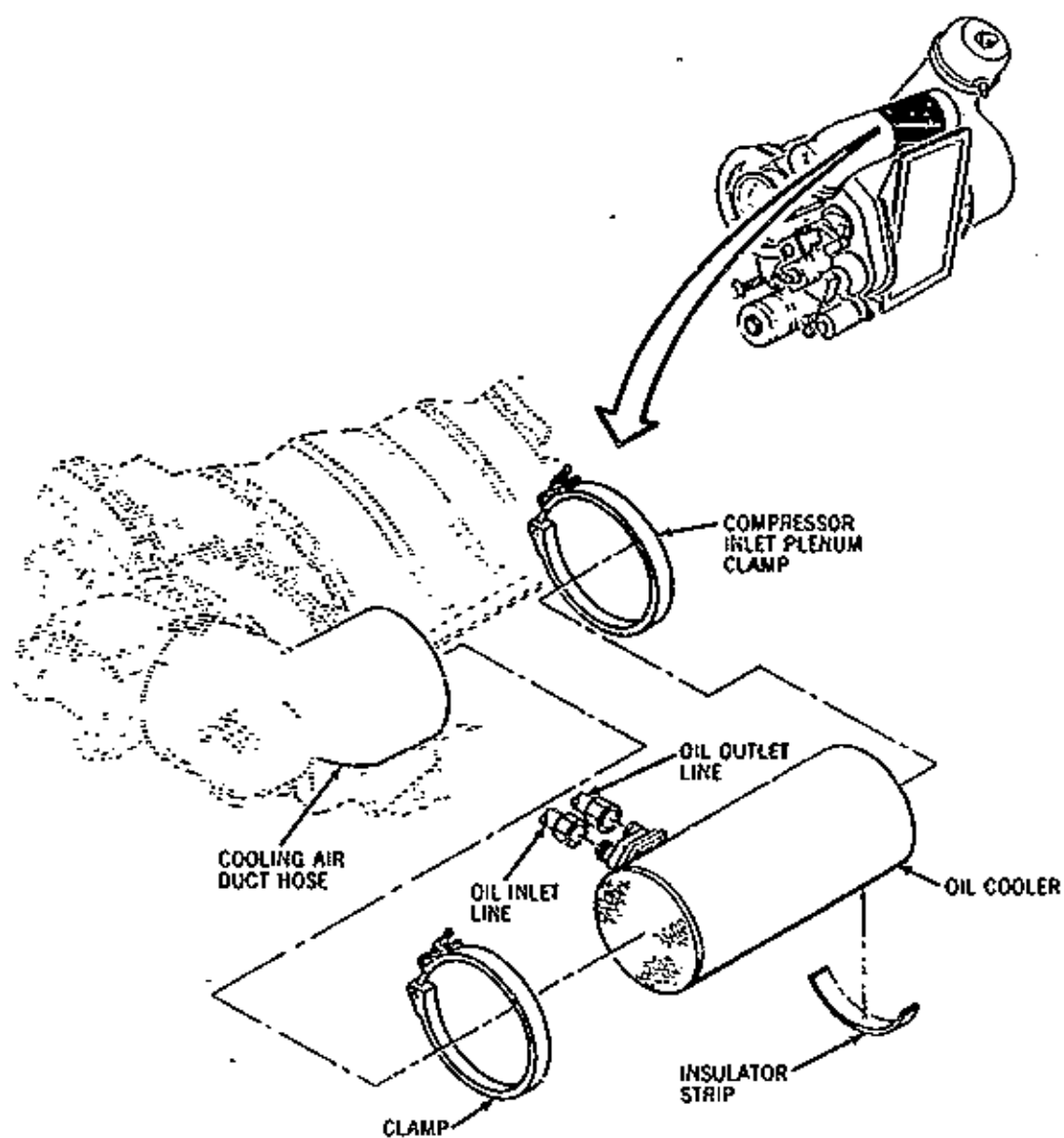
- (1) Open and tag APU control circuit breaker located on battery bus section of circuit breaker panel.
- R (2) Remove APU engine housing upper section (see Overhaul Manual, Chapter  
R 49-00-1).

NOTE: Container should be positioned to catch residual oil in oil inlet and outlet lines.

- (3) Disconnect oil inlet line from oil cooler. Cap line and fitting.
- (4) Disconnect oil outlet line from oil cooler. Cap line and fitting.
- (5) Loosen compressor intake plenum clamp securing aft end of cooler to APU.
- (6) Remove clamp connecting oil cooler to cooling air duct hose.
- (7) Remove oil cooler and insulator strip.



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Oil Cooler -- Removal/Installation  
Figure 201

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**8. Install Oil Cooler**

- (1) Make certain APU control circuit breaker located on battery bus section of circuit breaker panel is open and tagged.
- (2) Loosely install clamp, with bolt pointing upward, on forward end of oil cooler.
- (3) Position aft end of oil cooler, with insulator strip, into compressor intake plenum clamp.
- (4) Align and install cooling air duct hose over forward end of oil cooler. Position clamp, with clamp nut at one o'clock position, over support bracket and hose.
- (5) Tighten forward and compressor intake plenum clamp nuts to torque of 25 inch-pounds.
- (6) Connect oil inlet line to oil cooler.
- (7) Connect oil outlet line to oil cooler.
- (8) Install APU engine housing upper section (see Overhaul Manual, Chapter 49-00-1).
- (9) Remove tag and close APU control circuit breaker located on battery bus section of circuit breaker panel.

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OIL PUMP - MAINTENANCE PRACTICES

1. General

- A. The oil pump is mounted on the left side of the accessory gearcase. Components of the pump include a high-pressure pump, dual scavenge pumps, oil filter, pressure regulator valve, and oil temperature bulb. In addition, the oil pump housing provides a mounting pad for the tachometer generator.
- B. The oil pump is removed as a unit, it is not necessary to remove the tachometer generator before removing the oil pump. Access to the oil pump is through the APU engine housing fwd cover.

2. Tools and Equipment Required

NOTE: Equivalent substitutes may be used instead of the following item:

<u>Item</u>	<u>Name</u>	<u>Number</u>	<u>Manufacturer</u>	<u>Use</u>
A	Oil	MIL-L-7808		To lubricate oil pump O-rings

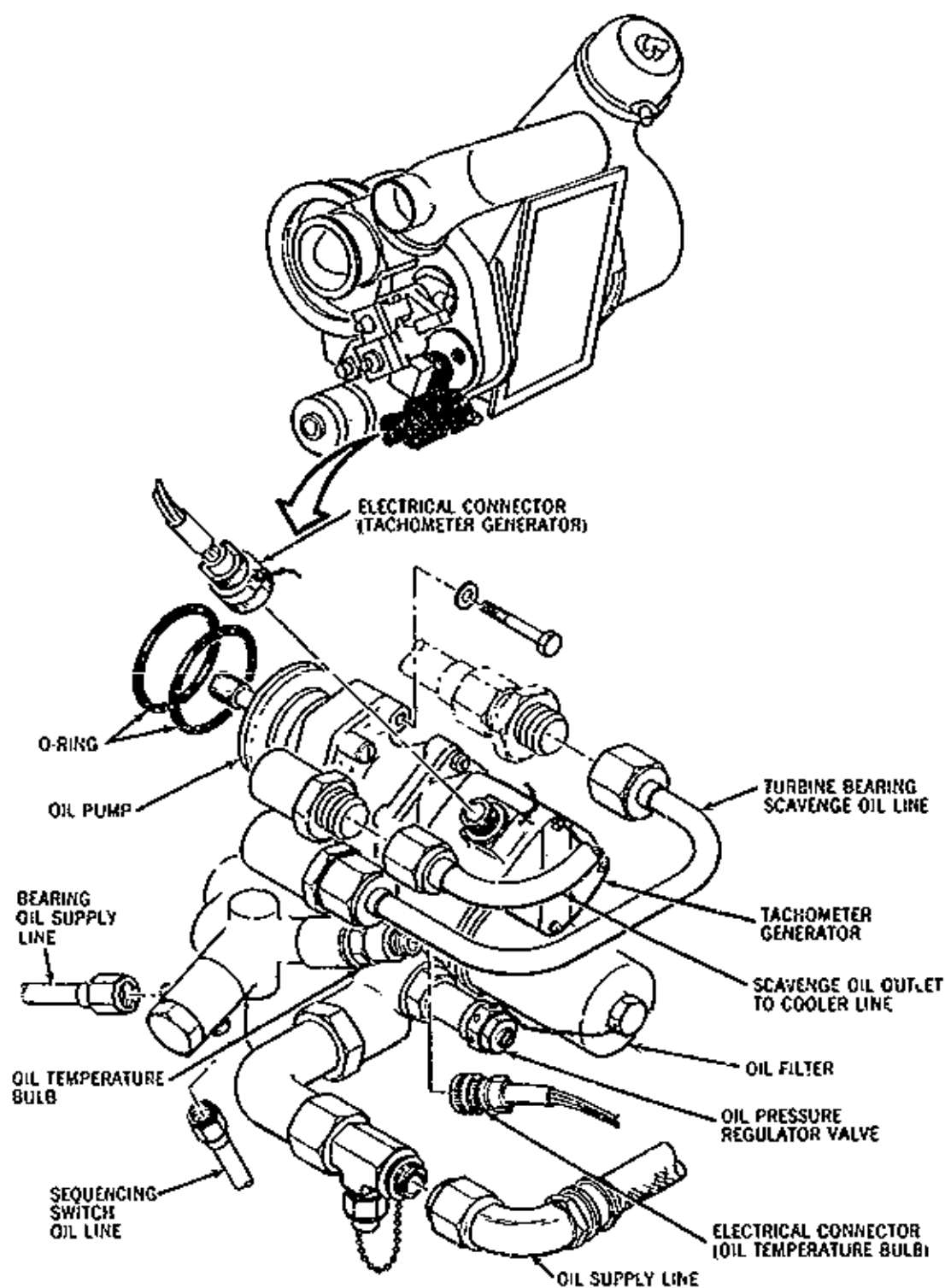
3. Removal/Installation Oil Pump

A. Remove Oil Pump

- (1) Open and tag APU control circuit breaker located on battery bus section of circuit breaker panel.
- (2) Drain APU oil tank (see 49-00, Servicing).
- (3) Remove APU engine housing fwd cover (see Overhaul Manual, Chapter 49-00-1).
- (4) Disconnect tachometer generator electrical connector.
- (5) Disconnect oil temperature bulb electrical connector.
- (6) Disconnect turbine bearing scavenge oil line.
- (7) Disconnect scavenge oil outlet to cooler line.
- (8) Disconnect bearing oil supply line.

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Oil Pump -- Removal/Installation  
 Figure 201

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- (9) Disconnect sequencing switch oil line.
- (10) Disconnect oil supply line.
- (11) Remove oil pump attaching bolts and washers.
- (12) Remove oil pump.

**B. Install Oil Pump**

- (1) Make certain APU control circuit breaker located on battery bus section of circuit breaker panel is open and tagged.
- (2) Lightly coat new O-rings with oil (MIL-L-7808) and install on oil pump.
- (3) Carefully insert oil pump drive shaft into accessory drive and engage mating splines.
- (4) Install oil pump attaching bolts and washers. Tighten bolts to torque of 50 to 70 inch-pounds.
- (5) Connect oil supply line.
- (6) Connect sequencing switch oil line.
- (7) Connect bearing oil supply line.
- (8) Connect scavenge oil outlet to cooler line.
- (9) Connect turbine bearing scavenge oil line.
- (10) Connect oil temperature bulb electrical connector.
- (11) Connect tachometer generator electrical connector.
- (12) Install APU engine housing fwd cover (see Overhaul Manual, Chapter 49-00-1).
- (13) Fill APU oil tank (see Chapter 12).
- (14) Remove tag and close APU control circuit breaker located on battery bus section of circuit breaker panel.

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OIL FILTER - MAINTENANCE PRACTICES

1. General

- A. The oil filter is mounted on the lower left side of the oil pump housing. It is not necessary to drain the oil tank when replacing the oil filter element, but a container should be provided to catch residual oil trapped in the filter case. Access to the filter is through the APU engine housing fwd cover.

2. Tools and Equipment Required

NOTE: Equivalent substitutes may be used instead of the following item:

<u>Item</u>	<u>Name</u>	<u>Number</u>	<u>Manufacturer</u>	<u>Use</u>
A	Oil	MIL-L-7808		To lubricate oil filter O-rings

3. Removal/Installation Oil Filter

A. Remove Oil Filter

- (1) Open and tag APU control circuit breaker located on battery bus section of circuit breaker panel.
- R (2) Remove APU engine housing fwd cover (see Overhaul Manual, Chapter  
R 49-00-1).
- (3) Remove filter case by unscrewing case from oil pump housing.

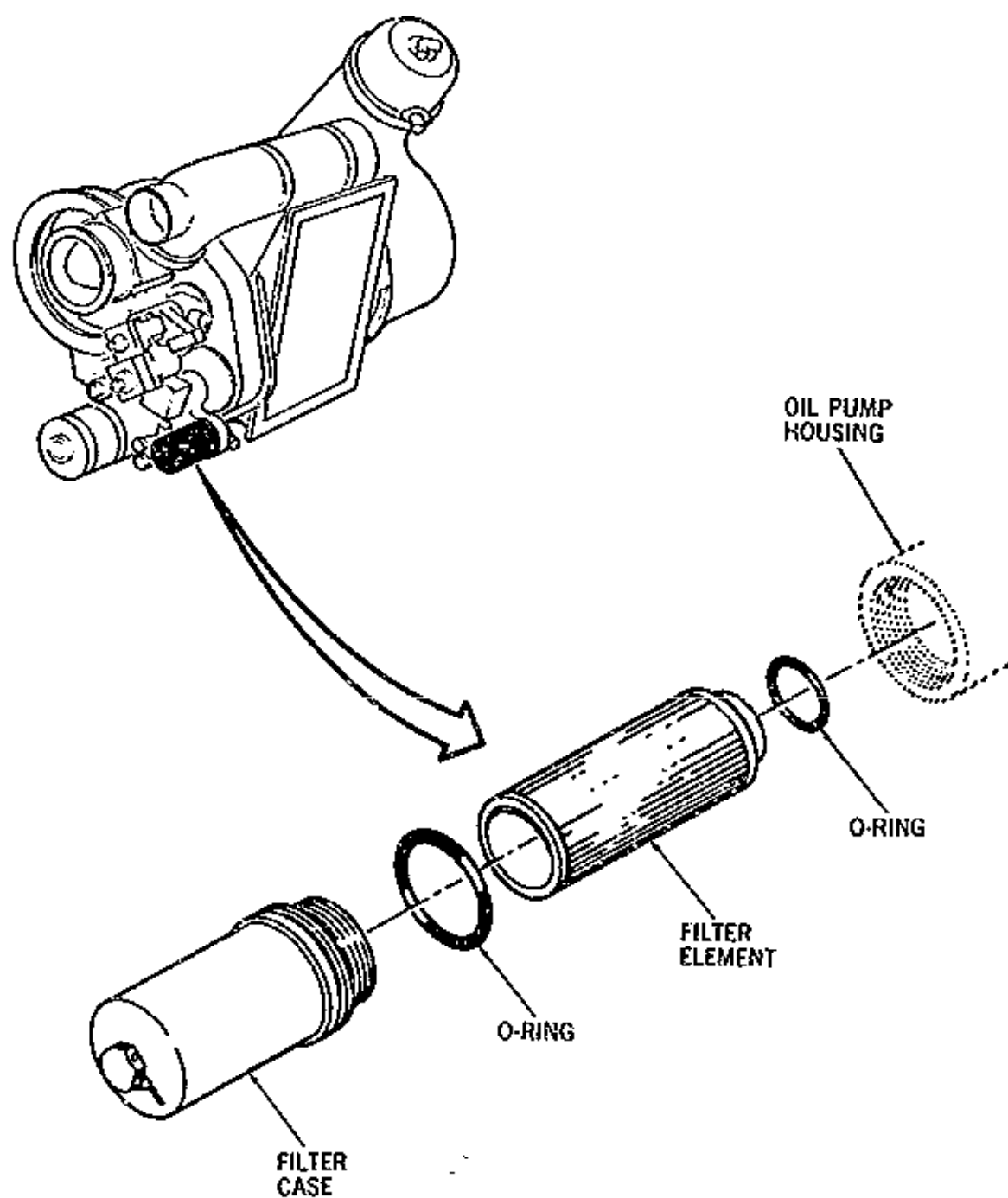
NOTE: Position container to catch residual oil from filter case.

- (4) Remove filter element from case and discard.
- (5) Remove O-ring from case and discard.

B. Install Oil Filter

- (1) Make certain APU control circuit breaker located on battery bus section of circuit breaker panel is open and tagged.
- (2) Insert new filter element in case.

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Oil Filter Element -- Removal/Installation  
Figure 201

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- (3) Lightly coat new O-rings with oil (MIL-L-7808) and install on filter element and case.
- (4) Install filter case by screwing into oil pump housing.

**CAUTION:** DO NOT EXCEED TORQUE OF 25 INCH-POUNDS WHEN TIGHTENING FILTER CASE.

- (5) Install APU engine housing fwd cover (see Overhaul Manual, Chapter 49-00-1).

#### 4. Adjustment/Test Oil Filter

##### A. Test Oil Filter

- (1) Start APU (see 49-00, Adjustment/Test).
- (2) Check filter case for leakage. If no leakage occurs, allow engine to run at no-load governed speed for at least 3 minutes.
- (3) Shut down APU (see 49-00, Adjustment/Test) and check oil level in tank. If required, replenish as necessary (see Chapter 12).

#### 5. Inspection/Check Oil Filter

##### A. Check Filter Element

- (1) Remove oil filter element (see paragraph 3.).
- (2) Check filter element for metal particles and other foreign materials which may indicate engine damage.
- (3) Install oil filter (see paragraph 3.).



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OIL LOW PRESSURE TRANSDUCER - MAINTENANCE PRACTICES

1. General

- A. The oil low pressure transducer is mounted on a bracket located on the APU accessory drive gearcase. Access to the transducer is through the APU engine housing forward cover.

WARNING: MAKE CERTAIN APU HAS COOLED SUFFICIENTLY AFTER SHUTDOWN TO PERMIT SKIN CONTACT. MAKE CERTAIN APU BATTERY SWITCH IN FLIGHT COMPARTMENT IS IN OFF POSITION.

2. Removal/Installation Oil Low Pressure Transducer

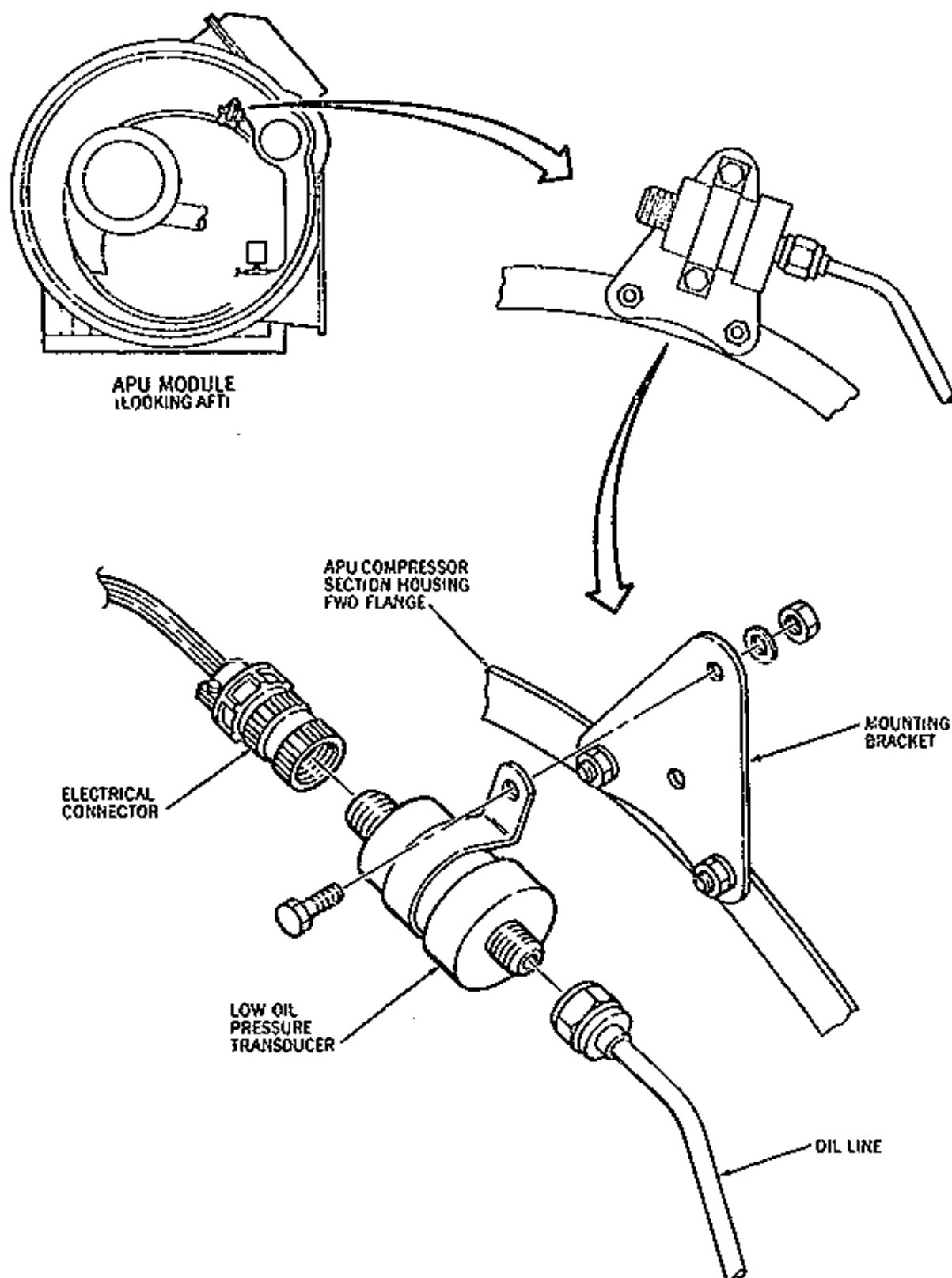
A. Remove Transducer

- (1) Open and tag APU control circuit breaker located on battery bus section of circuit breaker panel.
- (2) Remove APU engine housing fwd cover (see Overhaul Manual, Chapter 49).
- (3) Disconnect transducer oil line.
- (4) Disconnect transducer electrical connector.
- (5) Remove transducer from mounting bracket.

B. Install Transducer

- (1) Make certain APU control circuit breaker located on battery bus section of circuit breaker panel is open and tagged.
- (2) Position transducer on mounting bracket and install attaching bolts, washers and nuts.
- (3) Connect transducer oil line.
- (4) Connect transducer electrical connector.
- (5) Install APU engine housing fwd cover (see Overhaul Manual, Chapter 49).
- (6) Remove tag and close APU control circuit breaker located on battery bus section of circuit breaker panel.

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Oil Low Pressure Transducer --- Removal/Installation  
Figure 201

**CHAPTER**

**52**

**DOORS**

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C H A P T E R 5 2

D O O R S

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HIGHLIGHTS

TO: ALL HOLDERS OF DC-8, SERIES SEVENTY MAINTENANCE MANUAL

CONCERNING: REVISION 19, CHAPTER 52, DATED: APR 1/88

52-CONT REVISED TO PROVIDE NEW GENERIC TABLE OF CONTENTS.

52-IDENT REVISED TO PROVIDE NEW GENERIC AIRPLANE IDENTIFICATION LIST.

MANUAL UPDATE INSTRUCTIONS

PLEASE INSERT REVISED AND NEW PAGES INTO THIS MANUAL IN ACCORDANCE WITH THE CURRENT LIST OF EFFECTIVE PAGES. ALL EXISTING PAGES IN YOUR MANUAL THAT ARE BEING REPLACED WITH REVISED PAGES ARE TO BE REMOVED FROM YOUR MANUAL.

AN (\*) ASTERISK IN FRONT OF AN ENTRY ON THE LIST OF EFFECTIVE PAGES INDICATES NEW OR REVISED PAGES.

A LIST OF PAGES DELETED BY THE CURRENT REVISION IS BEING FURNISHED AS A PART OF THE HIGHLIGHTS AND DELETED PAGES SHOULD BE REMOVED FROM YOUR MANUAL.

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52-EFF		1	APR 1/88	52-36-1	50	508	MAR 1/86
52-CONT		1	APR 1/88	52-36-1	50	509	MAR 1/86
52-CONT		2	APR 1/88	52-36-1	50	510	MAR 1/86
52-IDENT		1	APR 1/88	52-36-1	50	511	JUN 1/86
52-IDENT		2	APR 1/88	52-36-1	50	512	JUN 1/86
52-IDENT		3	APR 1/88	52-36-1	50	513	JUN 1/86
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52-36-1	50	5	MAR 1/86	52-36-1	50	602	JUN 1/86
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52-36-1	50	9	JUN 1/86	52-36-3	50	201	MAR 1/86
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52-36-1	50	19	MAR 1/86	52-36-5	50	203	MAR 1/86
52-36-1	50	20	MAR 1/86	52-36-6	50	201	MAR 1/86
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52-36-1	50	405	MAR 1/86	52-36-8	50	205	MAR 1/86
52-36-1	50	406	MAR 1/86	52-70-0	50	1	MAR 1/86
52-36-1	50	407	MAR 1/86	52-70-0	50	2	MAR 1/86
52-36-1	50	501	MAR 1/86	52-70-0	50	3	MAR 1/86
52-36-1	50	502	MAR 1/86	52-70-0	50	4	MAR 1/86
52-36-1	50	503	MAR 1/86	52-70-0	50	101	MAR 1/86
52-36-1	50	504	MAR 1/86	52-70-0	50	102	MAR 1/86
52-36-1	50	505	MAR 1/86	52-70-0	50	501	MAR 1/86
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\*The asterisk indicates pages revised or added by the current revision.

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CHAPTER 52

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AIRPLANE IDENTIFICATION

Manufacturing Series	Factory Serial Numbers	Fuselage Numbers
DC8-71	45810	252
DC8-71	45811	262
DC8-71	45812	277
DC8-71	45813	284
DC8-71	45849	289
DC8-71	45891	305
DC8-71CF	45897	313
DC8-71CF	45898	320
DC8-71CF	45900	316
DC8-71CF	45902	294
DC8-71	45907	288
DC8-71	45913	325
DC8-71	45914	292
DC8-71	45915	295
DC8-73CF	45936	344
DC8-71CF	45938	331
DC8-71CF	45939	351
DC8-71	45941	317
DC8-71	45944	326
DC8-71	45945	337
DC8-71	45946	339
DC8-71	45947	341
DC8-71CF	45948	321
DC8-71CF	45949	329
DC8-71CF	45950	354
DC8-71CF	45952	338
DC8-71	45963	355
DC8-73CF	45966	393
DC8-73CF	45967	385
DC8-73CF	45968	389
DC8-71	45970	343
DC8-71	45971	356
DC8-71	45973	358
DC8-71	45974	368
DC8-71	45975	369
DC8-71	45976	372
DC8-71	45977	373
DC8-71	45978	381
DC8-71	45979	363

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AIRPLANE IDENTIFICATION

Manufacturing Series	Factory Serial Numbers	Fuselage Numbers
DC8-71	45983	350
DC8-73CF	45990	375
DC8-73CF	45991	380
DC8-71	45993	382
DC8-71	45994	387
DC8-71	45995	388
DC8-71	45996	397
DC8-71	45997	398
DC8-71	45998	399
DC8-73CF	46001	395
DC8-73CF	46002	394
DC8-73AF	46003	401
DC8-73AF	46004	403
DC8-73AF	46006	413
DC8-73AF	46007	422
DC8-73AF	46008	423
DC8-72CF	46013	427
DC8-71	46014	400
DC8-71	46018	420
DC8-73AF	46019	411
DC8-71	46029	425
DC8-71	46030	426
DC8-73	46033	431
DC8-71	46039	448
DC8-71	46040	449
DC8-72CF	46043	443
DC8-73AF	46044	432
DC8-73CF	46045	441
DC8-73CF	46046	444
DC8-73CF	46047	447
DC8-71	46048	450
DC8-73CF	46049	479
DC8-73CF	46051	440
DC8-73CF	46052	442
DC8-73	46053	446
DC8-71	46055	492
DC8-71	46056	495
DC8-73CF	46059	456
DC8-73CF	46062	486
DC8-73	46063	457

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AIRPLANE IDENTIFICATION

Manufacturing Series	Factory Serial Numbers	Fuselage Numbers
DC8-71	46064	459
DC8-71	46065	460
DC8-71	46066	462
DC8-72	46067	455
DC8-71	46072	477
DC8-73CF	46073	485
DC8-73AF	46074	468
DC8-73	46076	451
DC8-73AF	46080	466
DC8-72	46081	471
DC8-72	46082	458
DC8-72	46084	473
DC8-73CF	46086	478
DC8-73CF	46087	454
DC8-73CF	46089	501
DC8-73CF	46090	504
DC8-73CF	46091	519
DC8-73CF	46094	482
DC8-73	46095	497
DC8-71	46099	507
DC8-73	46100	502
DC8-73CF	46101	489
DC8-73CF	46103	483
DC8-73CF	46104	488
DC8-73CF	46106	490
DC8-73CF	46108	522
DC8-73CF	46109	493
DC8-73CF	46112	520
DC8-73CF	46117	525
DC8-73	46123	508
DC8-73	46124	511
DC8-73	46125	515
DC8-72CF	46130	542
DC8-73CF	46133	534
DC8-73CF	46135	531
DC8-73CF	46140	528
DC8-73CF	46149	538

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FORWARD UPPER CARGO DOOR - DESCRIPTION AND OPERATION

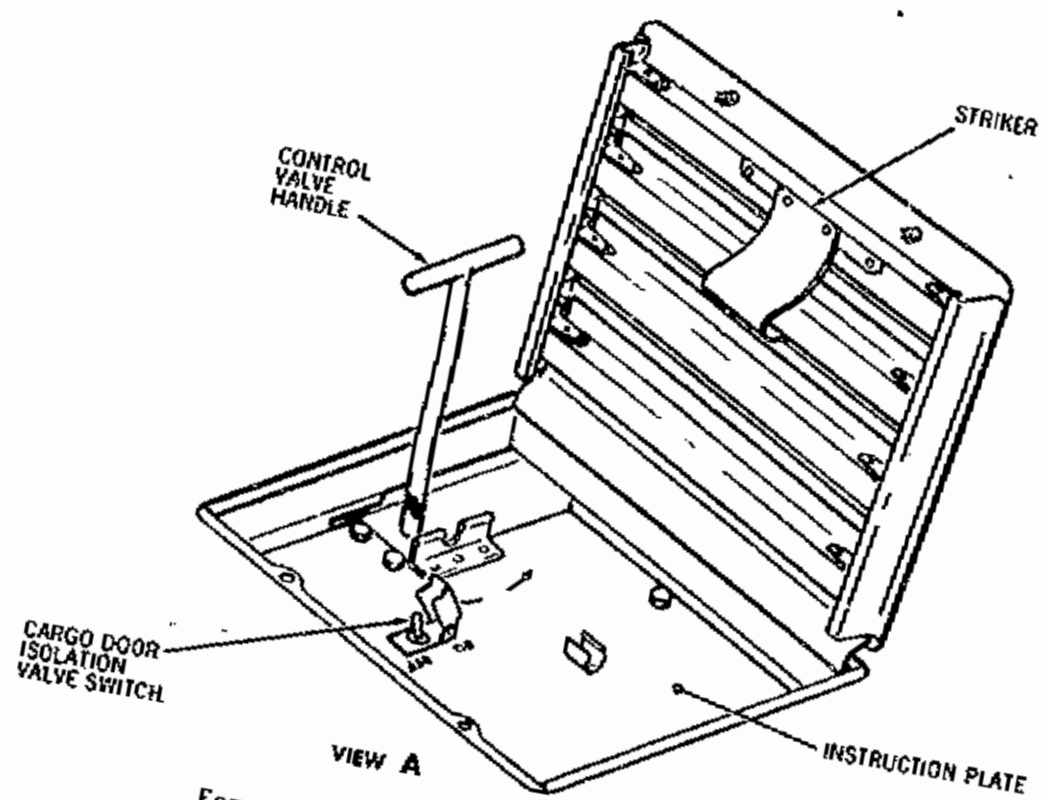
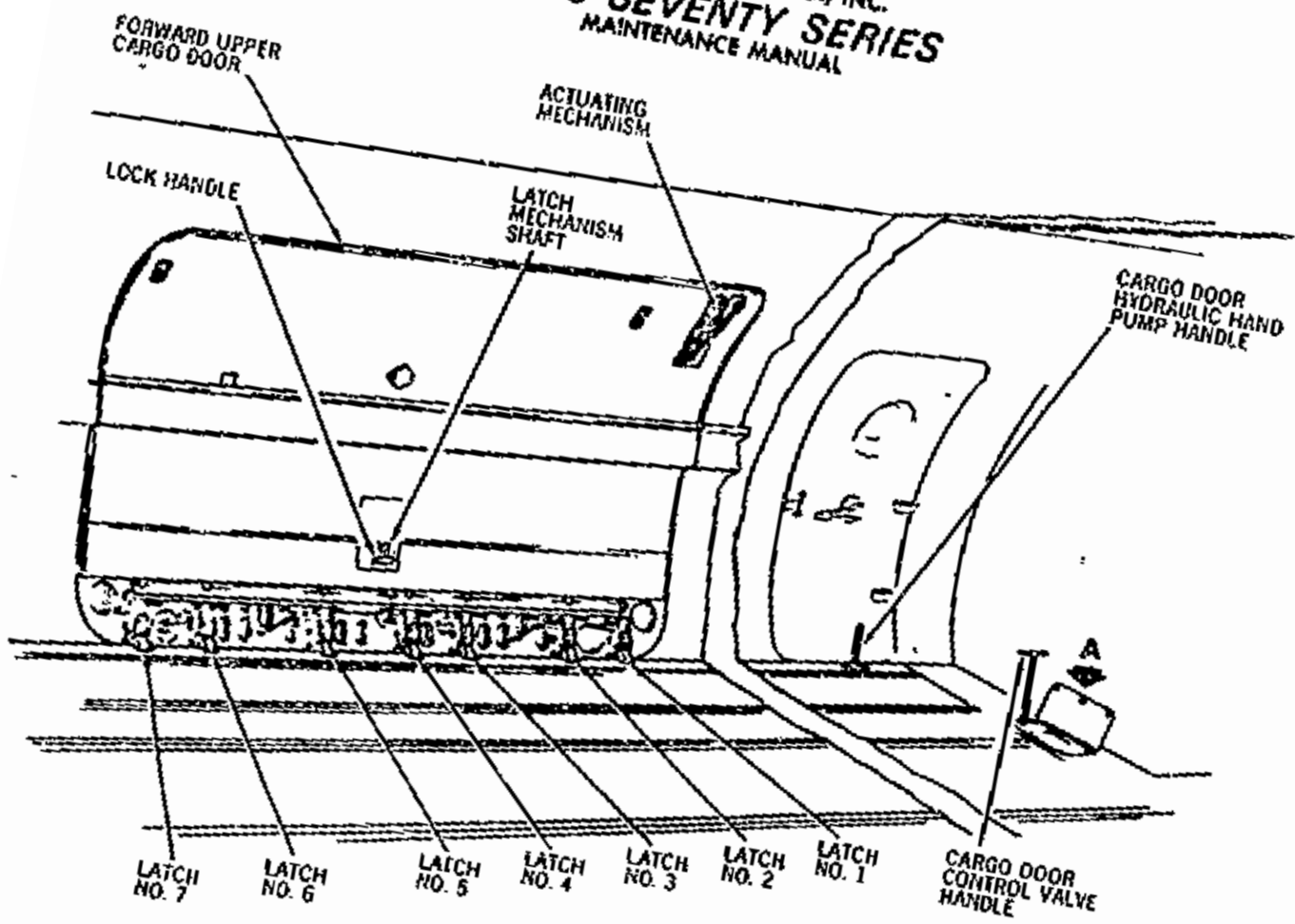
1. General

- A. The forward upper cargo door provides an opening in the fuselage for the loading and unloading of cargo.

2. Description (See Figures 1, 2, and 3.)

- A. The forward upper cargo door is located on the left side of the fuselage in the forward section of the passenger compartment. The door is approximately 85x140 inches in size. The door is hinged at the top and opens outward and upward. The door is hydraulically operated by pressure supplied by the auxiliary hydraulic pump. A hand pump is provided to supply the pressure if pressure is not available from the auxiliary hydraulic pump.
- B. The structure of the door consists mainly of frames, intercostals, and stiffeners covered by inner and outer skins. The inner skin of the door is covered by a lining except in the area of the door actuating mechanism located in the upper forward corner of the door. A pressure seal is installed along the edge of the door to seal the door when the compartment is pressurized. A rain seal is installed along the upper edge of the door to protect the door lining when the door is open.
- C. The operating mechanism consists of latch assemblies installed on the lower edge of the door which engage spools installed on the doorjamb, a torque tube, a latching cylinder, a walking beam, lock pins, lockpin cylinder, a mechanically actuated check valve, a door actuating cylinder, a hand pump, interconnecting rods, links, cranks, and a control valve, and an isolation valve.
- D. The latch assemblies latch the door firmly to the airplane structure when the door is closed. The latch assemblies are connected to the torque tube (which extends approximately the full length of the door just above the latches) by short rods. The torque tube is actuated, to open and close the latches, by the latch cylinder. The latches may be opened or closed manually by attaching a handle (the hand pump handle may be used) to a

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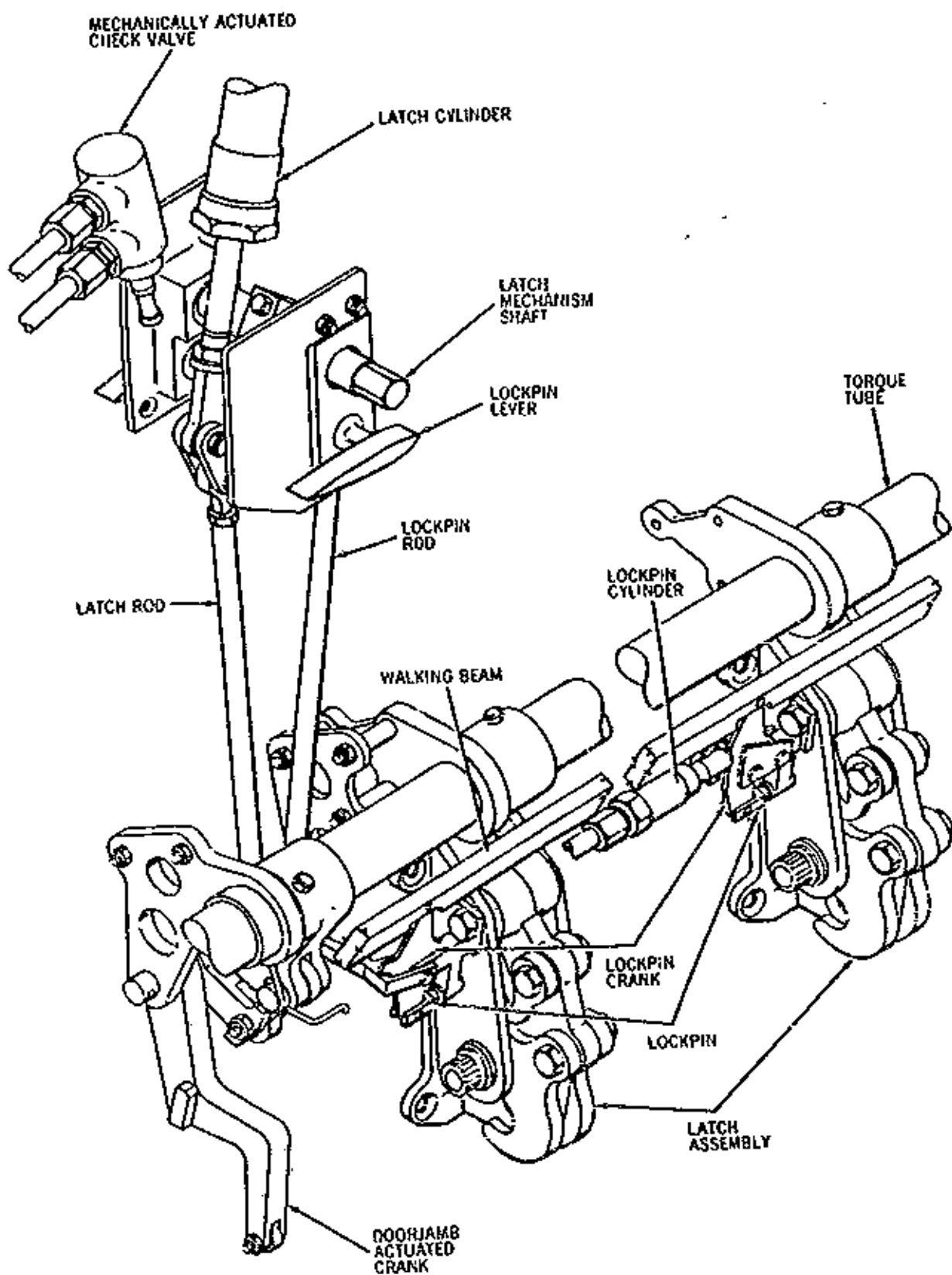


Forward Upper Cargo Door  
 Figure 1 (Sheet 1)

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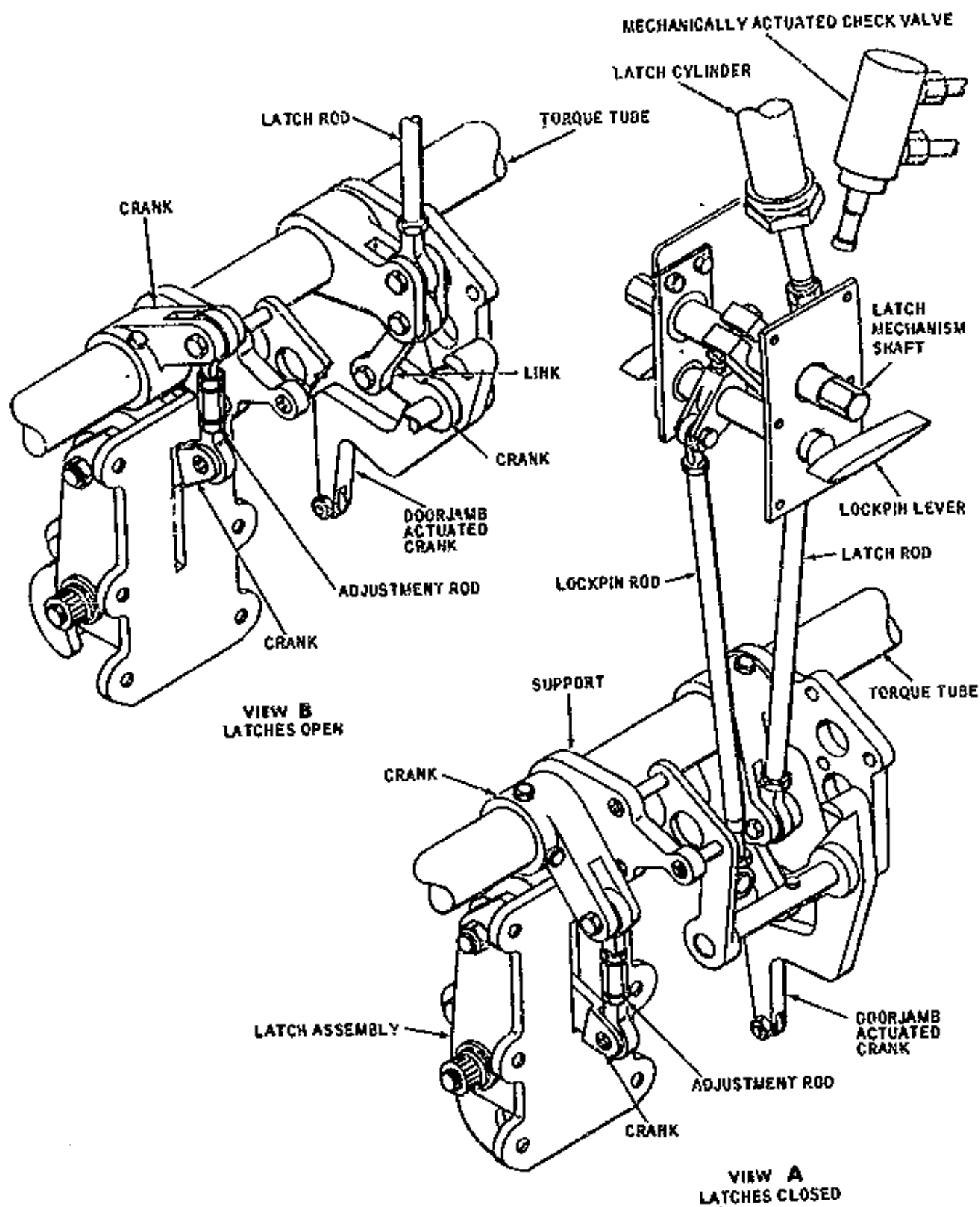
HA2-3237

Forward Upper Cargo Door  
 Figure 1 (Sheet 2)

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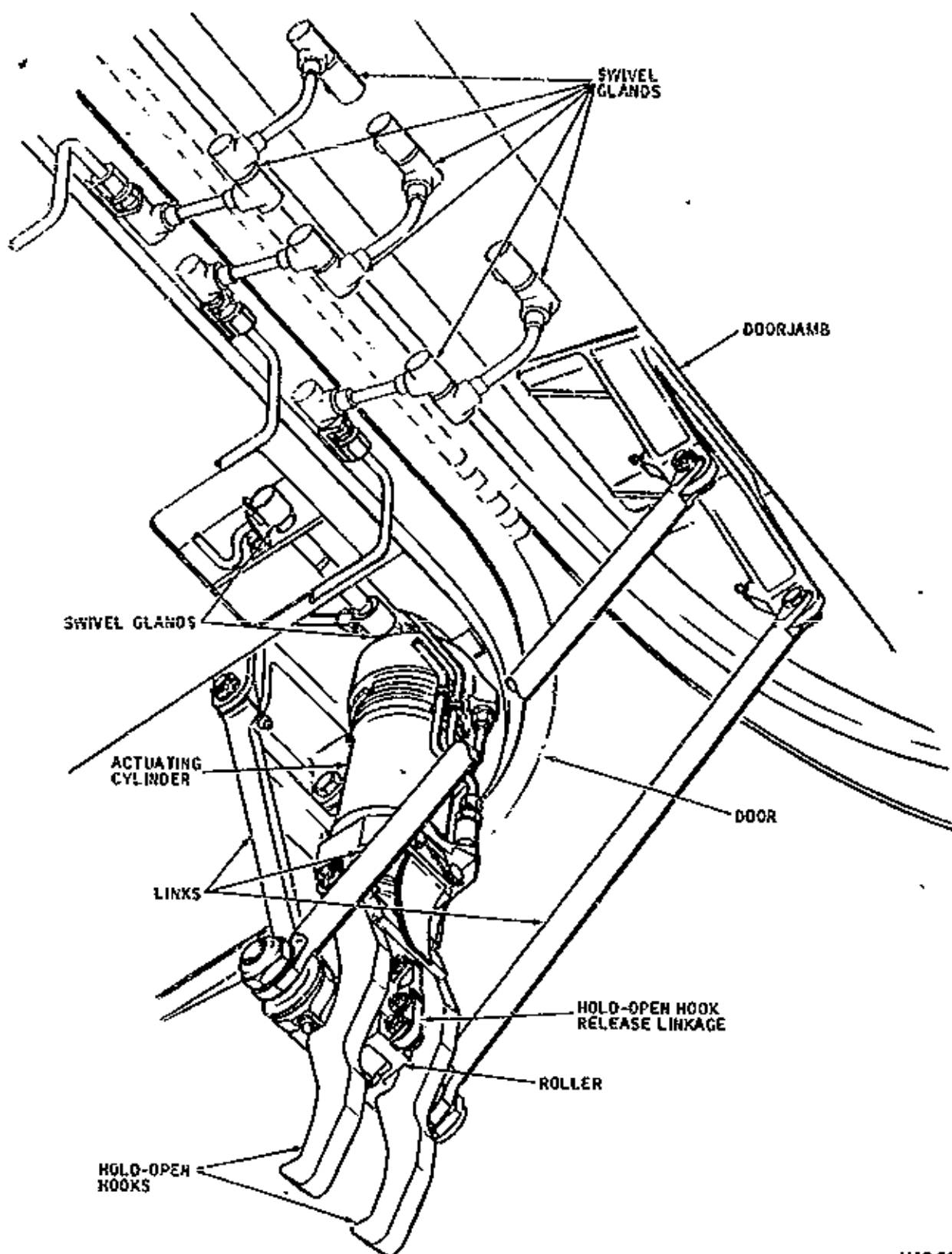
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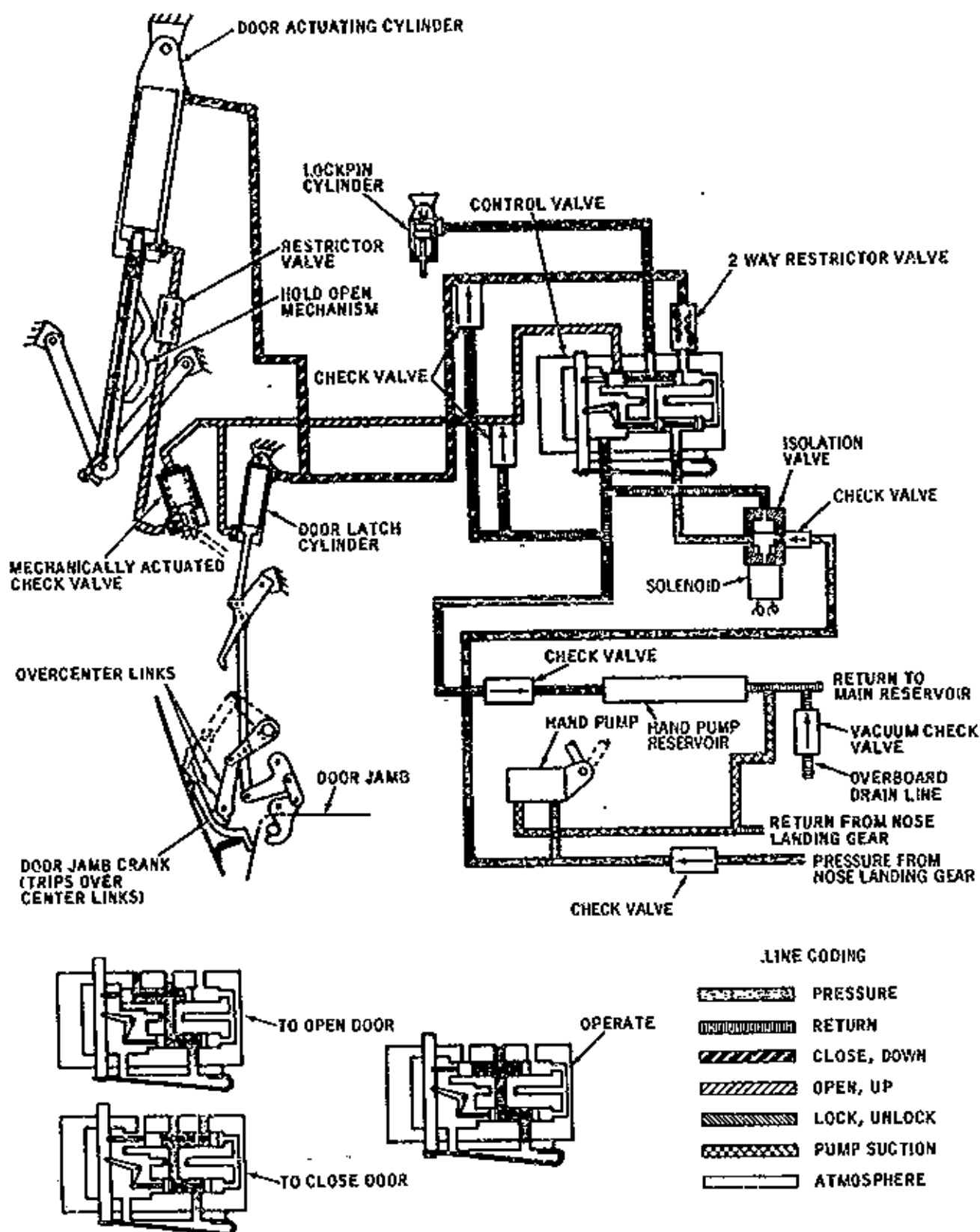
Forward Upper Cargo Door  
 Figure 1 (Sheet 4)

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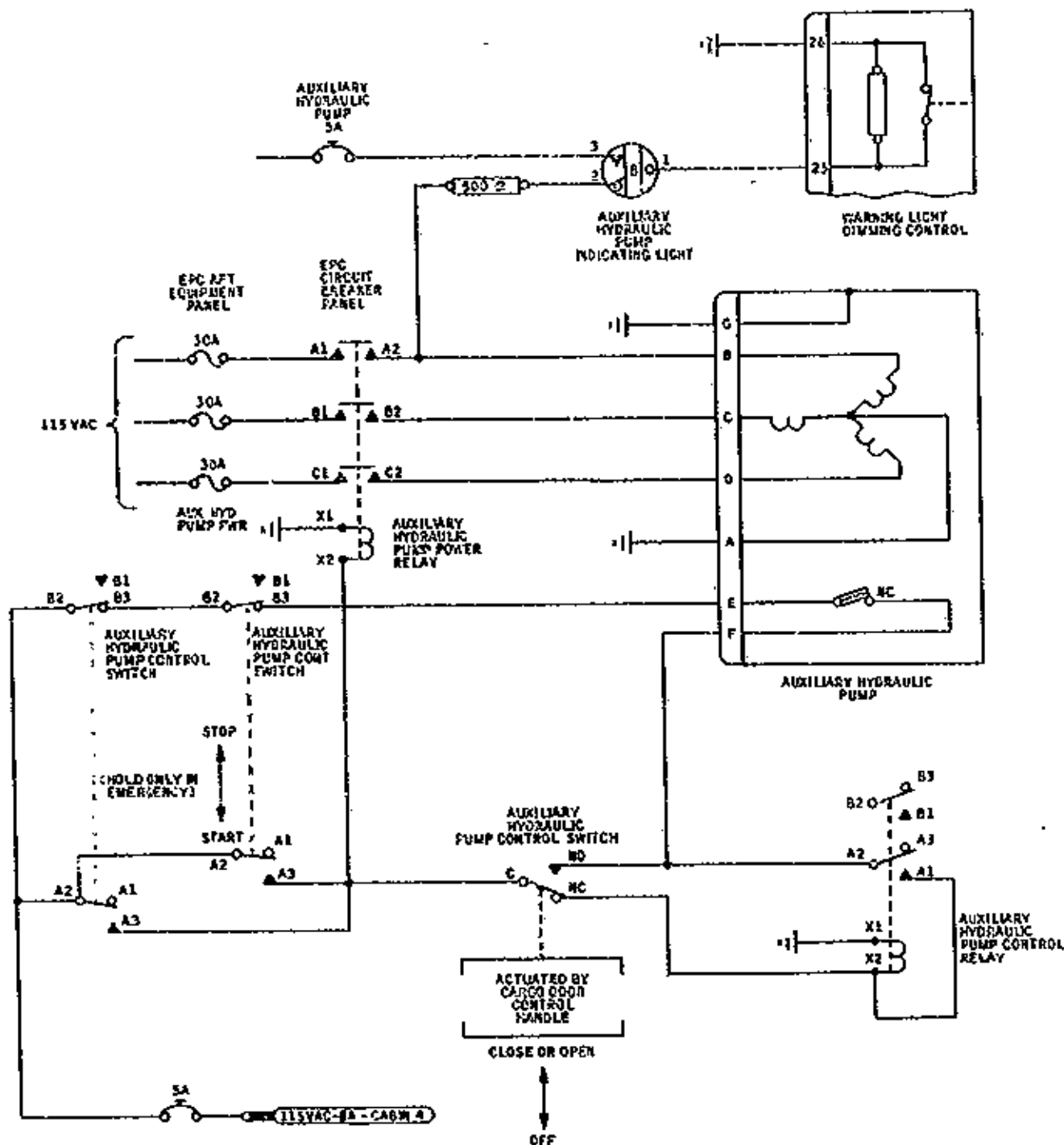


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**Auxiliary Hydraulic Pump Control -- Schematic**  
**Figure 3**

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shaft on the torque tube actuating mechanism (the shaft extends through the door so the latches may be actuated manually from inside or outside the airplane). The walking beam, which controls the movement of the lockpins by cranks and rods, is actuated by the lockpin cylinder to the unlocked position. The walking beam is spring loaded to return the beam and the lockpins to the locked position when hydraulic pressure is not applied to the lockpin cylinder. The walking beam may be actuated manually from inside or outside the airplane by a control lever attached to the walking beam actuating linkage. The lockpins lock the latch assemblies in the door latched position when the door is closed, and in the open position when the door open to prevent closing the latches with the door in the open position (the latches are also in an overcenter condition when the door is open). The door opening and closing mechanism consists of a cylinder and actuating links. One end of the cylinder is attached to the door structure. The other end is attached by the links to the door and the doorjamb. Hydraulic pressure to actuate the cylinder is controlled by the mechanically operated check valve. The valve is actuated by the latch assemblies torque tube mechanism when the latches are in the open position.

- E. Operation of the door is controlled by the control valve. The valve is located in a well in the floor inboard of the passenger forward entrance door. The valve is controlled by a handle attached to the valve shaft. The valve has five positions, lock (control handle raised to the vertical position; or stowed in the clip on the valve operation instruction plate, and the valve shaft in the spring-loaded down position), operate (control handle raised to the vertical position and pulled up to raise the valve shaft up and out of the spring-loaded down (lock) position), open (control handle rotated to the right), close (control handle rotated to the left), and neutral (control handle in the operate position and the spring-loaded position midway between the open and close positions). The valve shaft is spring-loaded to return to the neutral and lock positions.
- F. The hydraulic system of the door receives hydraulic pressure whenever pressure is supplied to the nose gear down line by the main or auxiliary hydraulic pumps, or by external source. Normally hydraulic pressure is supplied by the auxiliary hydraulic pump. The pump is controlled, for cargo door operation, by a switch actuated by the shaft of the control valve. The hand pump is used to supply hydraulic pressure whenever normal hydraulic pressure is not available.

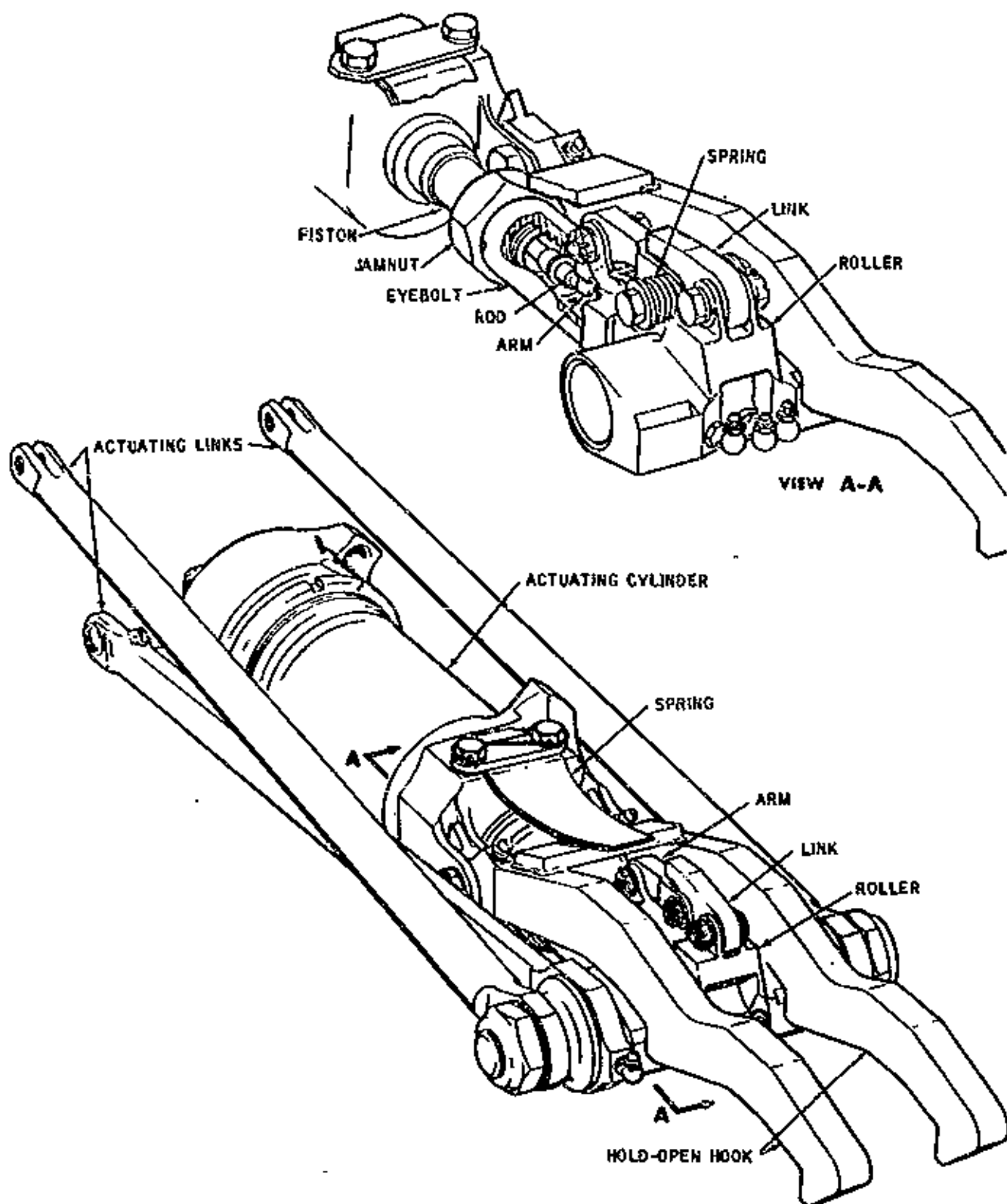
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3. Component Description

A. Forward Upper Cargo Door Actuating Cylinder (See Figure 4.)

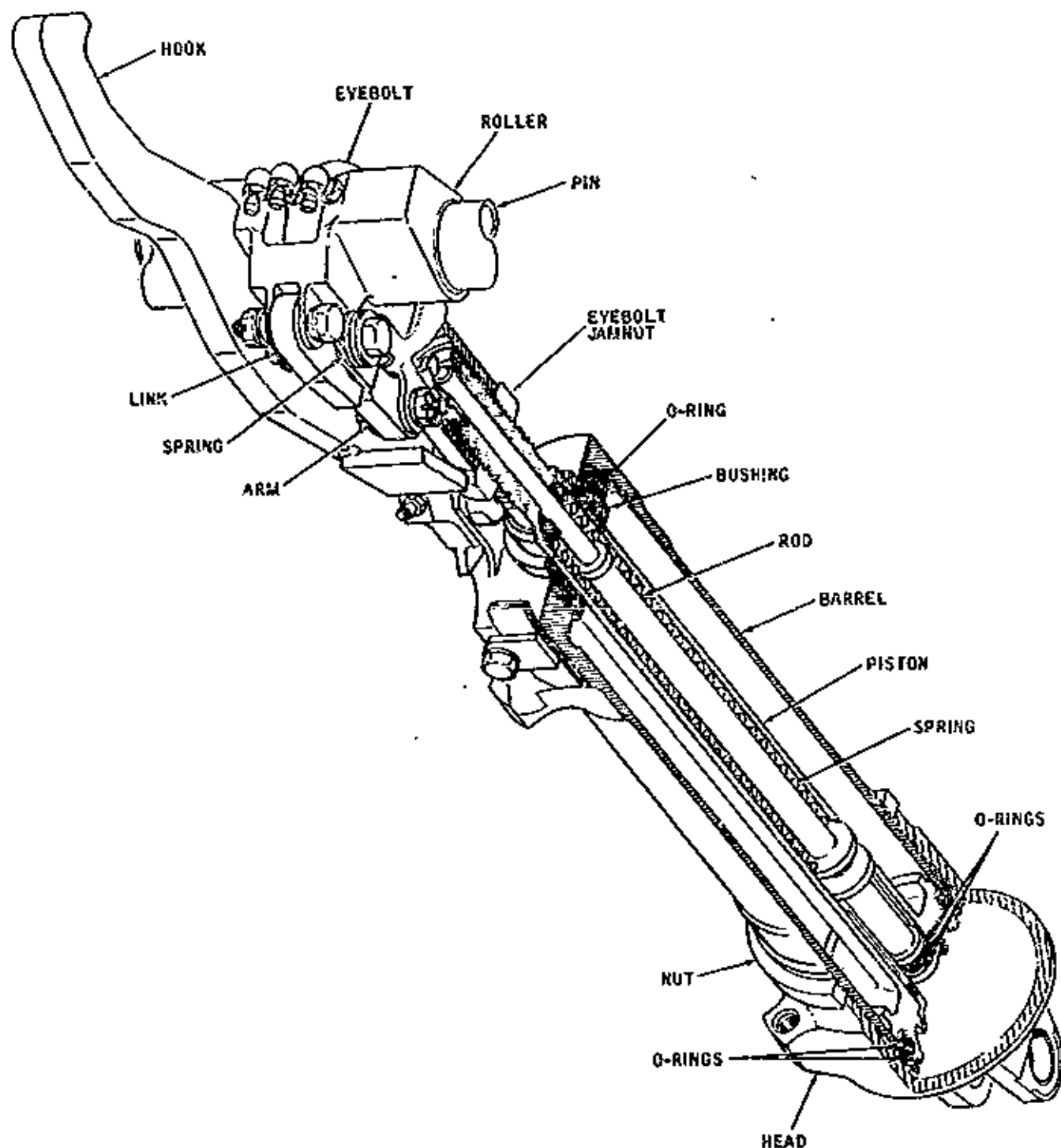
- (1) The function of the upper cargo door actuating cylinder is to open and close the cargo door. The cylinder consists of a barrel, actuating piston, a spring-loaded hook mechanism release rod, a barrel head, eyebolt fitting, a spring-loaded hold-open hook, a hook mechanism, and the necessary o-rings to prevent external and internal leakage of the cylinder. Two external ports, one in the barrel and one in the barrel head provide for connecting pressure/return lines to the cylinder. The barrel head is of the clevis type and anchors the cylinder to the door structure. The eyebolt fitting is installed on the end of the actuating piston and supports the hook mechanism. The fitting is connected to actuating links which are attached to the door and door-jamb. The hook mechanism release rod is contained within the actuating piston and unlocks the hook mechanism by forcing a spring-loaded arm and link of the hook mechanism from an overcenter position.
- (2) When pressure is applied to the retract port of the cylinder, the actuating piston retracts and the door opens. The shape of the spring loaded hold-open hooks allow the hooks to guide over the hook mechanism roller when the door is opening. The hold-open hooks are detented to hold the door open at the 86- and 166-degree positions without hydraulic pressure. When pressure is applied to the extend port of the cylinder, the actuating piston and hook mechanism release rod is extended. When the release rod is extended the spring-loaded arm and link of the hook mechanism is forced from the overcenter position to allow the hold-open hooks to rotate the hold-open hook mechanism roller to a position to release the hooks. The hold-open release rod will remain extended as long as pressure is applied to the extend port of the cylinder. When pressure to the extend port of the cylinder is relieved the spring of the hook release rod will return the rod to the retracted position and the arm and link of the hook mechanism will return to their overcenter position.

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Forward Upper Cargo Door Actuating Cylinder  
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**B. Forward Upper Cargo Door Control Valve (See Figure 5.)**

- (1) The function of the forward upper cargo door control valve is to control the operation of the door. The control valve consists of two slide type valves in a single body. One valve has two positions, lock and operate, and the other three positions, neutral, open, and close. The slides of the valve are connected to a single shaft. The shaft is spring loaded to return the slides to the lock and neutral positions.
- (2) The valve is installed in a well in the floor inboard of the passenger forward entrance door. The well is covered by a door which is secured to the floor by quick-release fasteners. A handle is attached to the shaft of the valve to control the valve operation. When not in use the handle may be folded downward into the well and secured by a clip. A switch is attached to the valve body for controlling the auxiliary hydraulic pump for cargo door operation. The switch is actuated by the valve shaft spring.

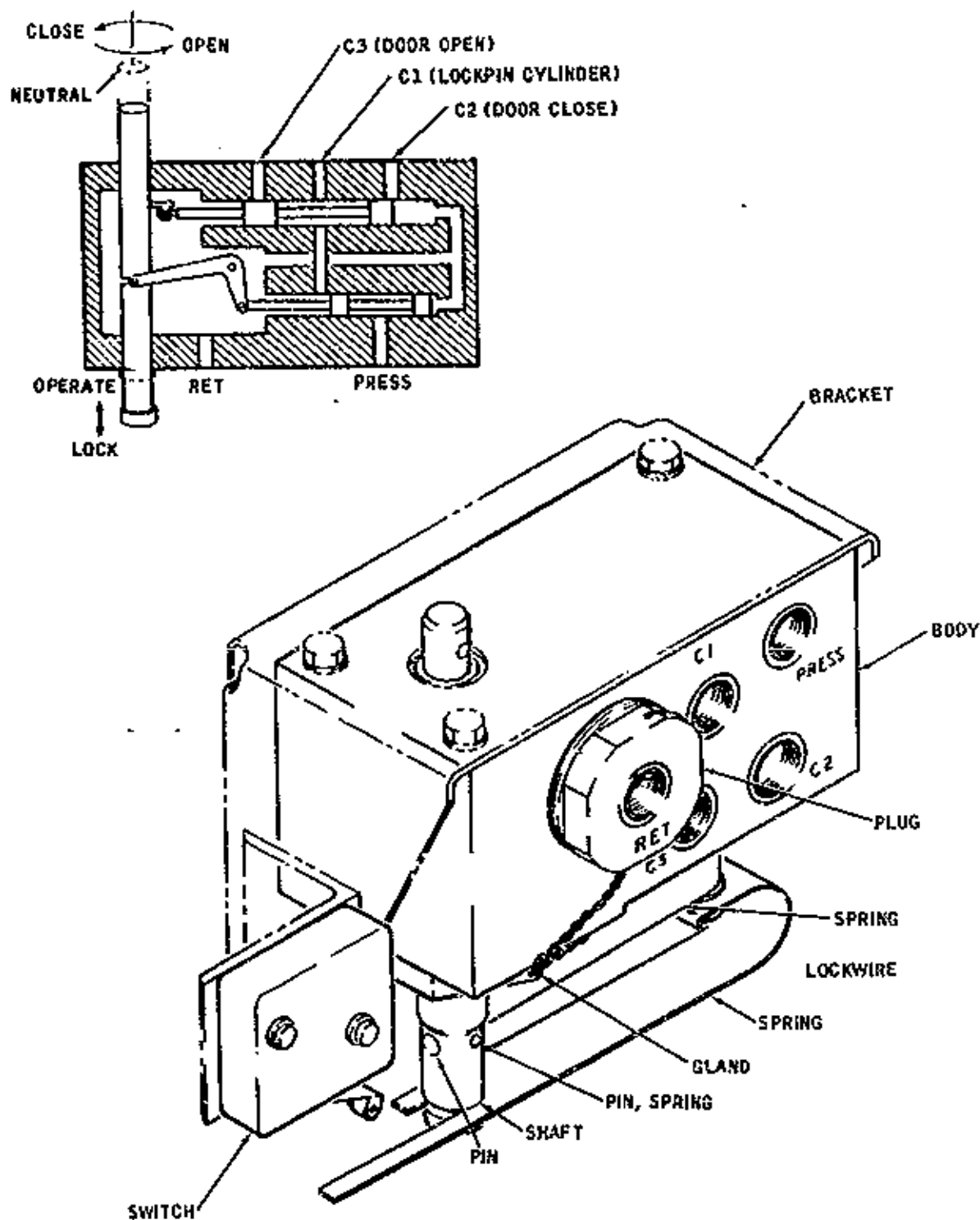
**C. Forward Upper Cargo Door Latch Cylinder (See Figure 6.)**

- (1) The function of the forward upper cargo door latch cylinder is to open and close the cargo door latch assemblies. The cylinder consists of a barrel head, piston, barrel end nut, adjustable rod end, and the necessary o-rings to prevent external and internal leakage. Two external ports, one in the barrel and one in the barrel end provide for connecting pressure/return lines to the cylinder. The barrel head is of the clevis type and is used to attach the cylinder to the door structure. The barrel end nut attaches to the barrel opposite the barrel head. The nut has a hole in the center to allow the actuating piston to extend and retract. The adjustable rod end is installed on the actuating piston and connects the piston to the mechanism of the latch assemblies.

**D. Forward Upper Cargo Door Lockpin Cylinder (See Figure 6.)**

- (1) The function of the forward upper cargo door lockpin cylinder is to move the lockpin walking beam to disengage the lockpins from the cargo door latch assemblies. The cylinder consists of a barrel, a piston, and the necessary o-rings to prevent external and internal leakage of the cylinder. A fitting is installed on one end of the barrel to connect a pressure/return line. External threads on the piston rod end of the barrel are provided for attaching the cylinder to a threaded support on the door structure.

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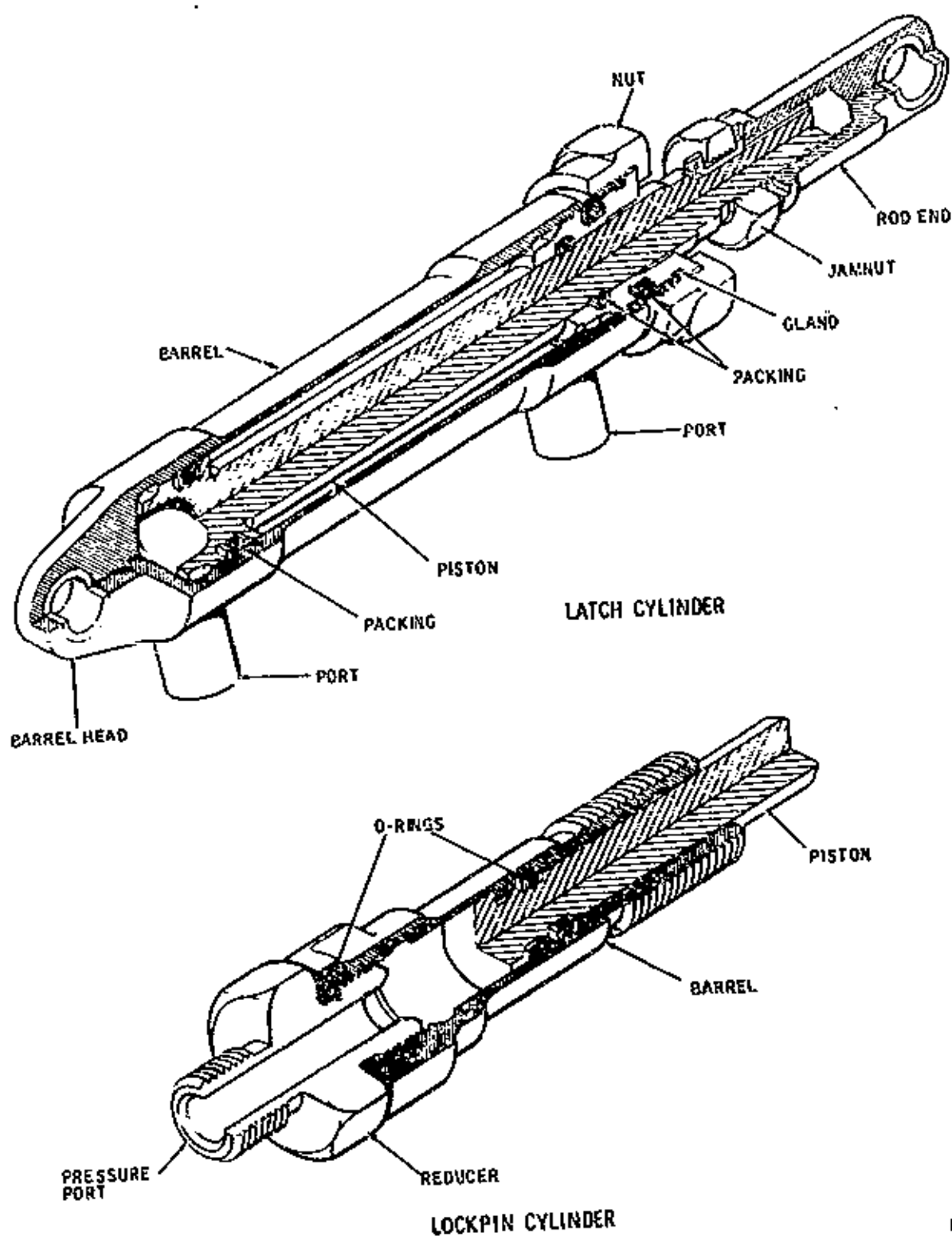
Forward Upper Cargo Door Control Valve  
 Figure 5

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**E. Forward Upper Cargo Door Hydraulic Hand Pump (See Figure 7.)**

- (1) The forward upper cargo door hydraulic hand pump is a single-piston double-action type hand pump. The pump is used to supply hydraulic pressure to the cargo door hydraulic system when the auxiliary hydraulic pump is not used. The pump consists of a pump body with suction and pressure ports, check valves, piston, a link, and the necessary o-rings to prevent external and internal leakage. When the piston of the pump is extended fluid is forced out on the extended side of the piston and sucked in from the reservoir on the retract side. When the piston of the pump is retracted the process is reversed. The pump is remotely operated by a rod attached to the link, which is connected to the piston, and a handle fitting installed in the floor adjacent to the passenger forward entrance door. The pump is installed on the floor structure just below the floor, and adjacent to the lower forward corner of the cargo door.

**F. Forward Upper Cargo Door Lining**

- (1) The forward upper cargo door lining serves as a vibration, heat and sound insulator, a decorative cover for the door structure, and a protection for the door operating mechanisms. The lining consists of panels similar in construction to the upper cargo compartment side panels.

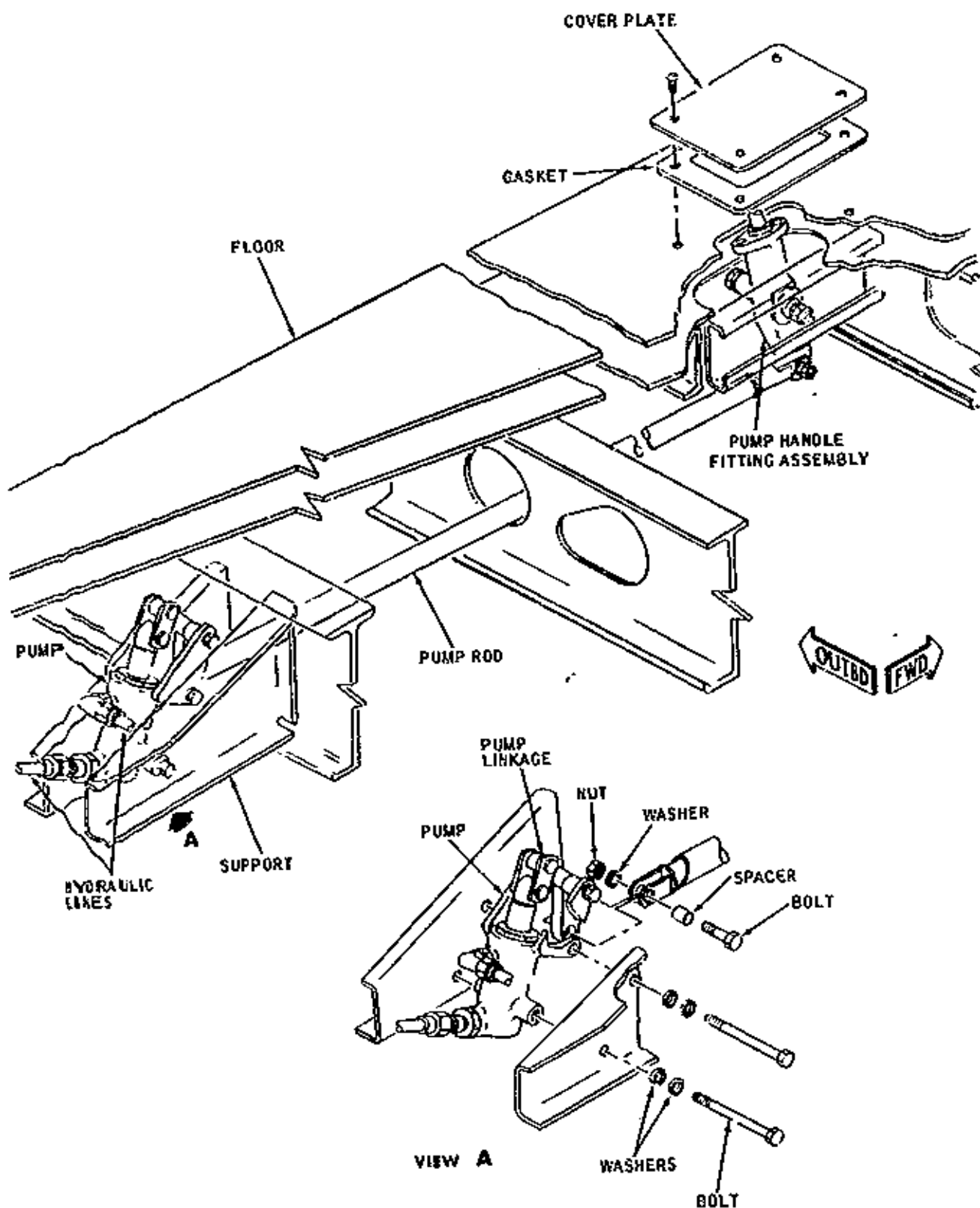
**G. Forward Upper Cargo Door Pressure Seal**

- (1) The forward upper cargo door pressure seal is installed along the edge of the door. The seal consists of moulded rubber tubular sections vulcanized together. The seal is secured to the door by retainer strips inserted in the seal and attached to the door structure by screws.

**H. Forward Upper Cargo Door Isolation Valve (See Figure 8.)**

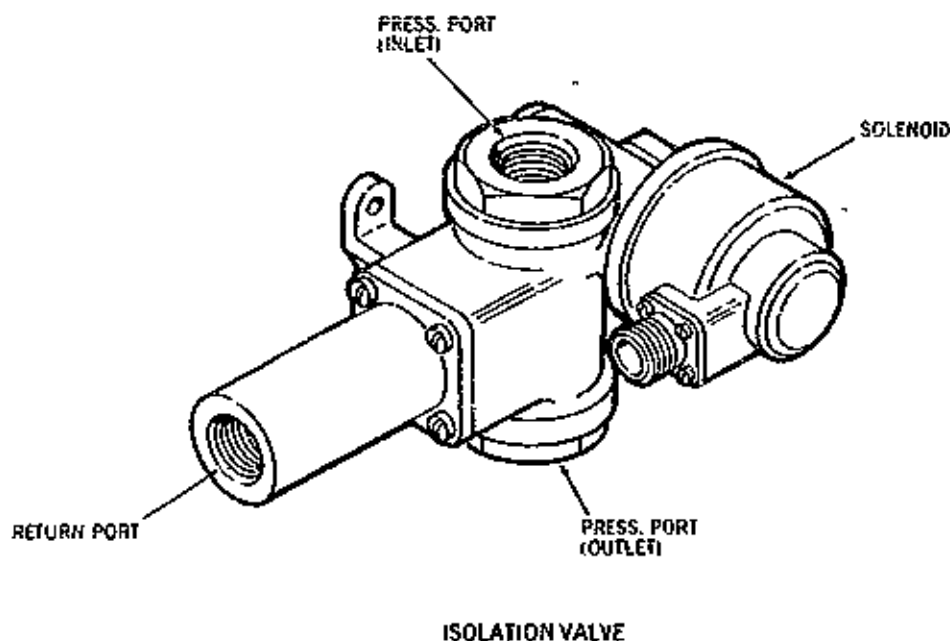
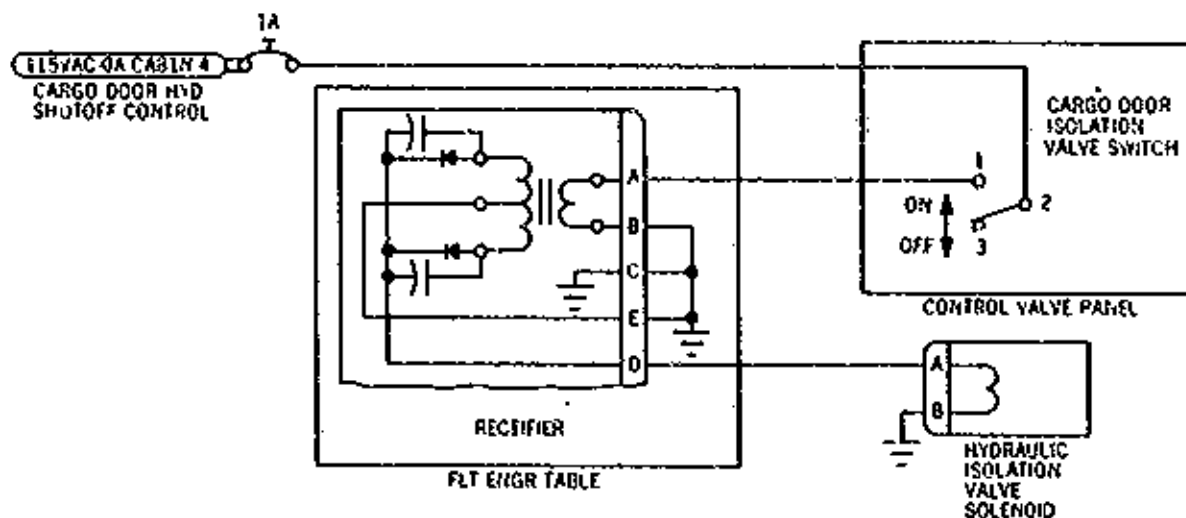
- (1) The forward upper cargo door isolation valve is located in the left tunnel area of the forward cargo compartment. The valve is operated by an electrical solenoid which is controlled by the cargo door isolation valve switch. The switch is located on the upper cargo door control panel adjacent to the door control valve.
- (2) The isolation valve opens when the solenoid is energized, permitting hydraulic pressure to reach the upper cargo door system. The valve automatically closes when the solenoid is deenergized, isolating the upper cargo door hydraulic system from all hydraulic pressure sources.

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ISOLATION VALVE

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Isolation Valve and Schematic  
 Figure 8

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4. Operation

CAUTION: TO PREVENT POSSIBLE STRUCTURAL DAMAGE TO AIRPLANE, FORWARD UPPER CARGO DOOR MUST BE CLOSED AND LATCHED WHEN RAISING (JACKING) OR LOWERING AIRPLANE. NO CARGO IS TO BE LOADED OR UNLOADED FROM UPPER CARGO COMPARTMENT WHILE AIRPLANE IS ON JACKS.

CAUTION: DO NOT TOW OR TAXI AIRPLANE WITH FORWARD UPPER CARGO DOOR OPEN OR UNLATCHED. DO NOT OPEN CARGO DOOR IF ACTUAL OR ANTICIPATED WIND VELOCITY WILL EXCEED 40 KNOTS, EXCEPT UNDER FOLLOWING CONDITIONS:

- (1) CARGO DOOR MAY BE OPENED TO 86 DEGREE OR 166 DEGREE POSITIONS WITH MAXIMUM WIND VELOCITY OF 40 KNOTS (STEADY) OR GUSTS TO 52 KNOTS.
- (2) IF WIND VELOCITIES FROM 40 TO 65 KNOTS ARE ANTICIPATED CARGO DOOR MAY BE OPENED TO 86 DEGREE POSITION ONLY IF AIRPLANE IS PARKED SO WIND DIRECTION IS AGAINST RIGHT SIDE OF AIRPLANE.

WIND VELOCITIES GREATER THAN 40 KNOTS DIRECTED AGAINST LEFT SIDE OF AIRPLANE WILL BLOW CARGO DOOR FROM 86 DEGREE POSITION TO FULL OPEN OR BEYOND THEREBY CAUSING DAMAGE TO FUSELAGE/ CARGO DOOR.

- A. To operate the cargo door with the cargo door normal hydraulic system the CABIN BUS 4 bus must be energized (see Chapter 24) and the auxiliary hydraulic pump control and the cargo door hydraulic control circuit breakers on the EPC circuit breaker panel closed. The cargo door isolation switch must be put in the ON position before any hydraulic pressure can activate the door.

WARNING: TO PREVENT POSSIBLE INJURY TO PERSONNEL OR DAMAGE TO AIRPLANE MAKE CERTAIN THAT ALL HYDRAULICALLY ACTUATED SYSTEMS ARE IN A SAFE CONDITION BEFORE ACTUATING CARGO DOOR HYDRAULIC CONTROL VALVE HANDLE.

- B. To open the door, the cargo door hydraulic control valve handle is placed in the operate position, then rotated to the open position. Moving the control handle from the lock to the operate position closes the contacts of the auxiliary hydraulic pump control switch to connect electrical power to the auxiliary hydraulic pump; opens the pump pressure shutoff section of the control valve to port pressure through internal ports in the valve to the door actuating section of the valve, and through external ports to the lockpin cylinder (linkage and cranks connected to the piston of the lockpin cylinder move the lockpin walking beam forward, pivoting the lockpin cranks and disengaging the lockpins from the latches). When the control handle is

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rotated to the open position, pressure is routed through an external port of the valve to the retract port of the latch cylinder. Linkage and cranks connected to the latch cylinder piston rotate the latch mechanism torque tube, rods connected to the torque tube and the latch assemblies actuate the latch mechanism to move the latch hooks to the open position. The check valve actuated by the latch mechanism linkage when the latches are open ports pressure to the retract port of the door actuating cylinder to open the door. As the door opens, a crank actuated by the doorjamb, releases spring-loaded links on the latch mechanism to allow the links of the latch assemblies to move to an overcenter position to prevent the latching cylinder from closing the latches when the control handle is placed in the closed position and the door is not fully closed. When the spring-loaded control valve is released it will return to the neutral and lock positions, deenergizing the auxiliary hydraulic pump.

- C. The door is held open at 86 and 166 degrees by a hydraulically controlled hold-open mechanism attached to the door actuating cylinder. The hook of the hold-open mechanism is detented to hold the door open at approximately 86 and 166 degrees without hydraulic pressure. When the opening motion of the door is stopped at either of these positions, a roller of the hook mechanism engages the detent on the hook and prevents the door from closing until the control handle is placed in the close position and hydraulic pressure is applied to the system. To position the door on the hold-open hook at the 86 or 166 degree position, the door must be opened to a position a few degrees higher than the desired position. The door control valve handle is then allowed to return to the spring-loaded neutral and lock positions; then, with the control handle in the lock (valve shaft down) position, the control handle is rotated momentarily to the closed position until the door rests on the hook.

NOTE: If the door control valve handle is not in the lock position when the handle is rotated to the close position, pressure will be applied to the close side of the door actuating cylinder and the hold-open mechanism will be tripped from the overcenter position and the door will close.

NOTE: The door is in an overcenter position when the piston rod of the door actuating cylinder is fully retracted. This condition prevents the door from resting on the hold-open hook at the 166 degree position when the control valve handle is rotated to the close position.

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- D. When the control handle is allowed to return to the neutral position, the pressure is trapped in the door actuating and latch cylinders to hold the door and latches open (the latches will remain open without hydraulic pressure). When the control handle is released and allowed to return to the lock position, the pressure in the lockpin cylinder is relieved. The spring-loaded walking beam will then move aft and the lockpins will engage a plate on the latch assemblies to lock the latch hooks in the open position.
- E. To close the door, the control handle is placed in the operate position, then rotated to the open position to lift the door off the hold open hook (this reduces fatigue loads on the hold-open hook mechanism caused by the simultaneous release of the hold-open hook and the downward motion of the door). The control handle is then placed in the close position. When the control handle is in the close position, pressure is ported to the extend port of the door actuating cylinder, and latch cylinder and to the lockpin cylinder. When pressure is applied to the extend port of the door actuating cylinder the hold-open mechanism is released and the actuating cylinder piston extended to close the door. When pressure is applied to the lockpin cylinder the piston extends to move the lockpin walking beam forward to disengage the lockpins from the plates on the latches to allow the latches to be closed. When the door closes, the doorjamb actuated crank trips the spring loaded latch mechanism links from overcenter to allow the latch cylinder piston to extend and close the latches. When the door is closed and latched the door control handle is released and allowed to return to the neutral and lock positions. When the control valve is in the neutral and lock positions, the pressure in the lockpin cylinder is relieved, and the spring loaded walking beam will move aft to engage the lockpins with the latches to lock the latch assemblies in the door latched position. When the latch assemblies are closed and locked, the black and white lines on the latches will be in alignment.
- F. The door control section of the control valve is open to the hydraulic system return line when the control handle is in the neutral or lock positions. This relieves the pressure on the extend side of the door actuating cylinder and the latch cylinder pistons when the door is stationary. The pump pressure shutoff section of the control valve is open to the system return line when the valve is in the lock position. This relieves the pressure in the lockpin cylinder. The relieving of the pressure in the door closed section of the door hydraulic system reduces the possibility of leakage due to pressure being trapped in the system for an extended period of time when the door is closed. This also permits the latch assemblies to be actuated manually with the manual controls located on the door.

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- G. A restrictor at the retract port of the door actuating cylinder and a restrictor at the extend port of the control valve controls the door opening and closing speeds. Four check valves are installed in the lines of the door hydraulic system. One check valve is installed upstream from the control valve to stop backflow of fluid through the nose gear line. A second check valve is installed between the hand pump reservoir and the control valve to prevent the flow of fluid from the reservoir into the airplane main hydraulic system. A vacuum relief valve is installed in the reservoir overboard vent line to prevent the flow of fluid overboard when the reservoir is full. A third check valve is installed in the door actuating cylinder down line between the control valve and the cylinder. When the system pressure is off this check valve allows fluid to flow from the up side to the down side of the actuating cylinder, this allows the hold-open mechanism to support the door. The fourth check valve is installed in the actuating cylinder up line between the control valve and the cylinder. When the system pressure is off, the check valve allows fluid to flow from the down side to the up side of the cylinder when air loads tend to lift the door when the door is open.
- H. Operation of the door with the hand pump is the same as with pressure supplied by the auxiliary hydraulic pump. Electrical power is not required except to activate the cargo door isolation solenoid so pressure can get to the cylinder. The check valve installed in the nose gear pressure line upstream from the control valve prevents the hand pump pressure from being applied to the nose gear down line.
- I. A system relief valve set to open at 3300 psi (full flow at 3500 psi) and reset at 3000 psi is installed between the pressure line and the system return line to relieve both the auxiliary hydraulic pump pressure and the hand pump pressure.
- J. To operate the door manually the lockpin control lever must be actuated (and held until the latches start to open) to the unlock position, and the latch mechanism shaft rotated to the open position (the hand pump handle may be used as a handle for the latch mechanism shaft). When the latches are open the door will swing open far enough to clear the latch assemblies from the spools on the doorjamb. The door may be raised to the desired position by a sling and hoist. If the door is raised past the 86 degree position, the hold-open mechanism must be released manually to close the door.
- K. When the door is unlatched and opened, switches actuated by the lockpin crank at the No. 6 latch assembly and the doorjamb, and a proximity switch actuated by the lockpin at the No. 2 latch assembly, complete a ground circuit to the door warning light in the flight compartment to provide the flight crew with a visual indication that the cargo door is open and/or that the latch assemblies are not in the latched position. For further information on the door warning system see 52-70-0.



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FORWARD UPPER CARGO DOOR - TROUBLE SHOOTING

1. General

- A. If door will not operate hydraulically make certain that auxiliary hydraulic pump is operating before trouble shooting the hydraulic operation of the cargo door. See Chapter 29 for auxiliary hydraulic pump operation.

**NOTE:** Operation of the auxiliary hydraulic pump may be checked with hydraulic pump control switch in crew compartment.

**WARNING:** TO PREVENT POSSIBLE INJURY TO PERSONNEL OR DAMAGE TO AIRPLANE MAKE CERTAIN THAT ALL HYDRAULICALLY ACTUATED SYSTEMS ARE IN A SAFE CONDITION BEFORE ENERGIZING AUXILIARY HYDRAULIC PUMP.

2. Trouble Shooting

Possible Cause	Isolation Procedure	Correction
A. WITH ELECTRICAL POWER ON AIRPLANE, ALL APPLICABLE CIRCUIT BREAKERS CLOSED, AND CONTROL HANDLE IN OPERATE AND OPEN POSITIONS, AUXILIARY HYDRAULIC PUMP WILL NOT OPERATE.		
(1) Auxiliary hydraulic pump control switch on control valve not functioning correctly.	Check operation and continuity of control switch.	Adjust or replace switch.
(2) Control valve handle and/or linkage not operating correctly.	Check operation of control handle.	Repair or replace.
B. WITH PRESSURE SUPPLIED BY AUXILIARY HYDRAULIC PUMP OR HANDPUMP DOOR WILL NOT OPEN.		
(1) Latches not open.	Check lockpins. If lockpins have not disengaged latches, unlock with lock handle on door. If door opens, check installation of lockpin cylinder.	Adjust.

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Possible Cause	Isolation Procedure	Correction
<b>B. WITH PRESSURE SUPPLIED BY AUXILIARY HYDRAULIC PUMP OR HANDPUMP DOOR WILL NOT OPEN. (Continued)</b>		
(1) (Continued)	Check lockpin cylinder for internal leakage.	Repair or replace cylinder.
	If lockpins have disengaged, check latch rigging.	Adjust rigging.
	If latch rigging is correct, check latch cylinder for internal leakage.	Repair or replace cylinder
(2) No pressure to door actuating cylinder.	Check adjustment of mechanically actuated check valve.	Adjust.
	If check valve opens, check actuating cylinder for internal leakage.	Repair or replace cylinder.
(3) Defective control valve	Check control valve for internal leakage.	Repair or replace control valve.
(4) Isolation valve not opening.	Check switch on control panel for operation and continuity.	Replace switch if necessary.
	Check solenoid valve for operation and continuity.	Replace solenoid if necessary.
	Check rectifier for operation.	Replace rectifier if necessary.

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Possible Cause	Isolation Procedure	Correction
<b>C. WITH PRESSURE SUPPLIED BY AUXILIARY HYDRAULIC PUMP OR HANDPUMP DOOR WILL NOT CLOSE.</b>		
(1) Hold-open hook release linkage damaged.	Check hold-open hook release mechanism.	Repair or replace linkage or replace actuating cylinder.
(2) No pressure to actuating cylinder.	Check operation of control valve	Repair or replace control valve.
(3) Defective actuating cylinder.	Check actuating cylinder for internal leakage.	Repair or replace actuating cylinder.
(4) Defective control valve.	Check control valve for internal leakage.	Repair or replace control valve

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FORWARD UPPER CARGO DOOR - REMOVAL/INSTALLATION

1. General

- A. The forward upper cargo door may be removed with the door lining installed. If the required maintenance will require the removal of the lining it may be removed before the door is removed from the airplane to minimize possible damage to the lining.

2. Tools and Equipment Required

NOTE: Equivalent substitutes may be used instead of the following listed item.

Item	Name	Number	Manufacturer	Use
A	Sling	C652-5772790	Douglas Aircraft Co., Inc.	Support cargo door during removal and installation

3. Removal/Installation Forward Upper Cargo Door

A. Remove Forward Upper Cargo Door

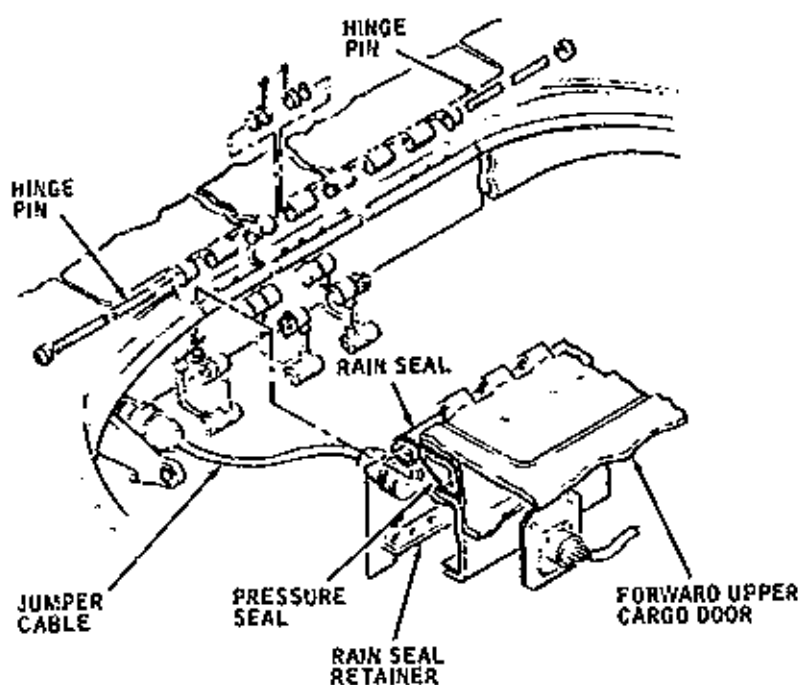
CAUTION: TO PREVENT POSSIBLE STRUCTURAL DAMAGE TO AIRPLANE, FORWARD UPPER CARGO DOOR MUST BE CLOSED AND LATCHED WHEN RAISING (JACKING) OR LOWERING AIRPLANE. NO CARGO IS TO BE LOADED OR UNLOADED FROM UPPER CARGO COMPARTMENT WHILE AIRPLANE IS ON JACKS.

CAUTION: DO NOT TOW OR TAXI AIRPLANE WITH FORWARD UPPER CARGO DOOR OPEN OR UNLATCHED. DO NOT OPEN CARGO DOOR IF ACTUAL OR ANTICIPATED WIND VELOCITY WILL EXCEED 40 KNOTS, EXCEPT UNDER FOLLOWING CONDITIONS:

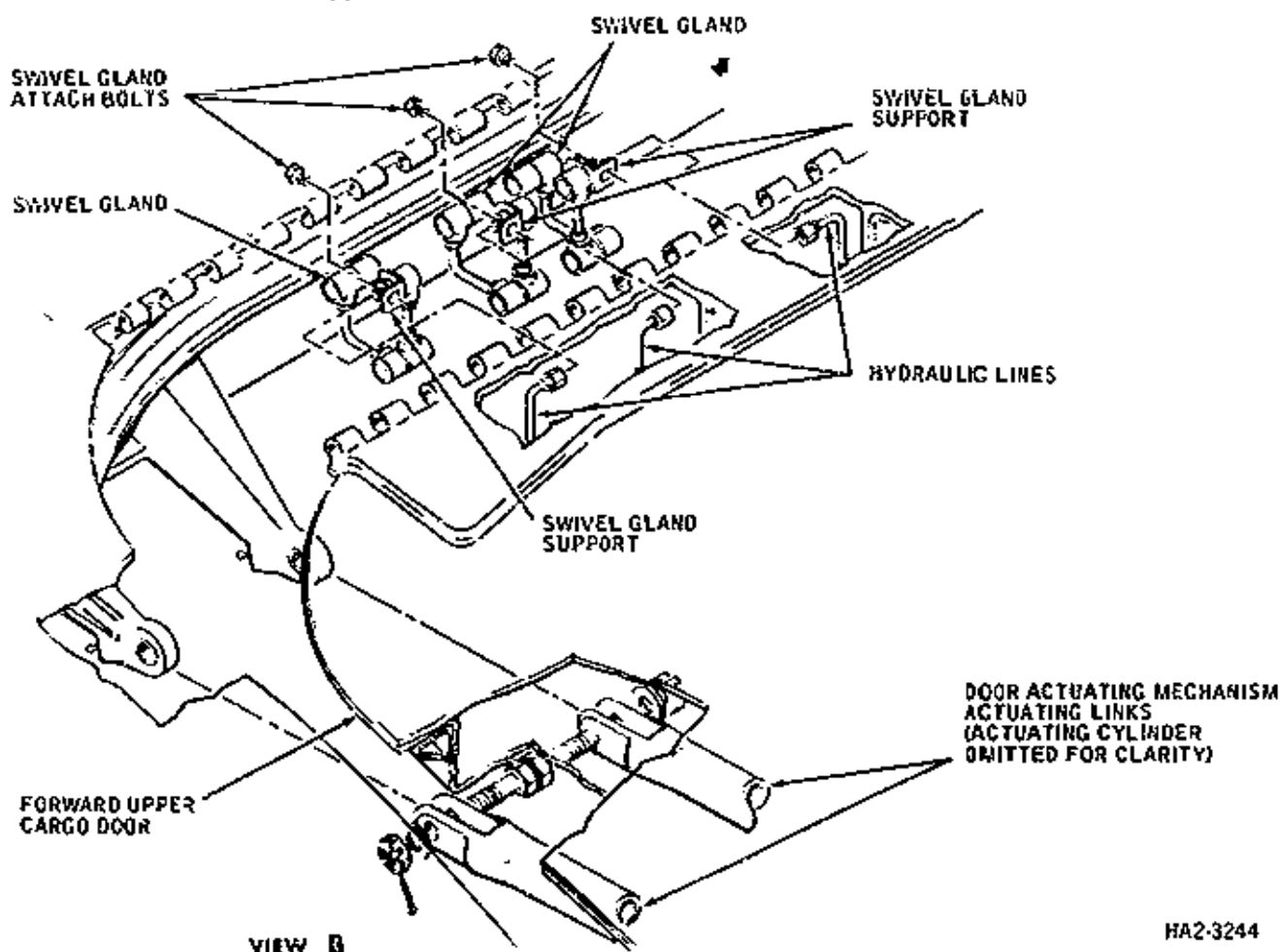
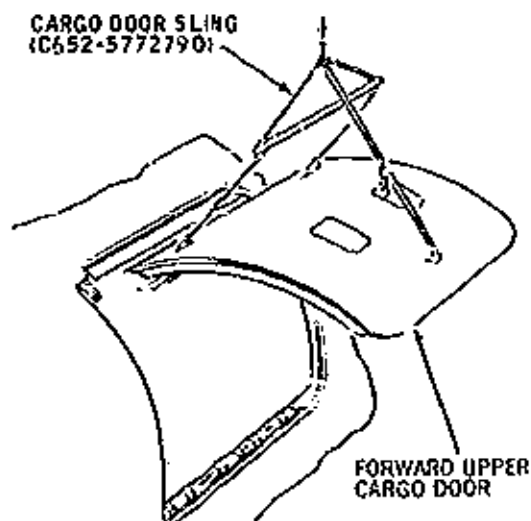
- (1) CARGO DOOR MAY BE OPENED TO 86 DEGREE OR 166 DEGREE POSITIONS WITH MAXIMUM WIND VELOCITY OF 40 KNOTS (STEADY) OR GUSTS TO 52 KNOTS.
- (2) IF WIND VELOCITIES FROM 40 TO 65 KNOTS ARE ANTICIPATED CARGO DOOR MAY BE OPENED TO 86 DEGREE POSITION ONLY IF AIRPLANE IS PARKED SO WIND DIRECTION IS AGAINST RIGHT SIDE OF AIRPLANE.

WIND VELOCITIES GREATER THAN 40 KNOTS DIRECTED AGAINST LEFT SIDE OF AIRPLANE WILL BLOW CARGO DOOR FROM 86 DEGREE POSITION TO FULL OPEN OR BEYOND THEREBY CAUSING DAMAGE TO FUSELAGE/ CARGO DOOR.

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VIEW A



VIEW B

Forward Upper Cargo Door - Installation  
 Figure 401

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- (1) Open auxiliary hydraulic pump and cargo door hydraulic control circuit breakers on EPC circuit breaker panel.

WARNING: TAG AND SAFETY CIRCUIT BREAKERS.

- (2) Relieve pressure in cargo door hydraulic system. Place CARGO DOOR ISOLATION VALVE switch in ON position and rotate door control valve handle to open and close positions with control handle in lock (valve shaft in spring-loaded down position) until pressure is dissipated. Place CARGO DOOR ISOLATION VALVE switch in OFF position.

- (3) Using controls on door unlock and unlatch door.

NOTE: The hand pump handle may be used as a wrench to unlatch the door.

- (4) Attach sling (C652-5772790) to door.
- (5) Connect a hoist to sling and lift door open to approximately 86 degrees.
- (6) Remove jumper cable between electrical connectors on upper edge of door and doorjamb.
- (7) Disconnect hydraulic lines in door from swivel glands on upper edge of door. Cap glands and lines.
- (8) Remove bolts attaching swivel gland supports to door.
- (9) Remove bolts attaching actuating links to doorjamb.
- (10) Remove rain seal and retainers from seal depressor on doorjamb.
- (11) Remove nuts from hinge pins.
- (12) Remove hinge pins.

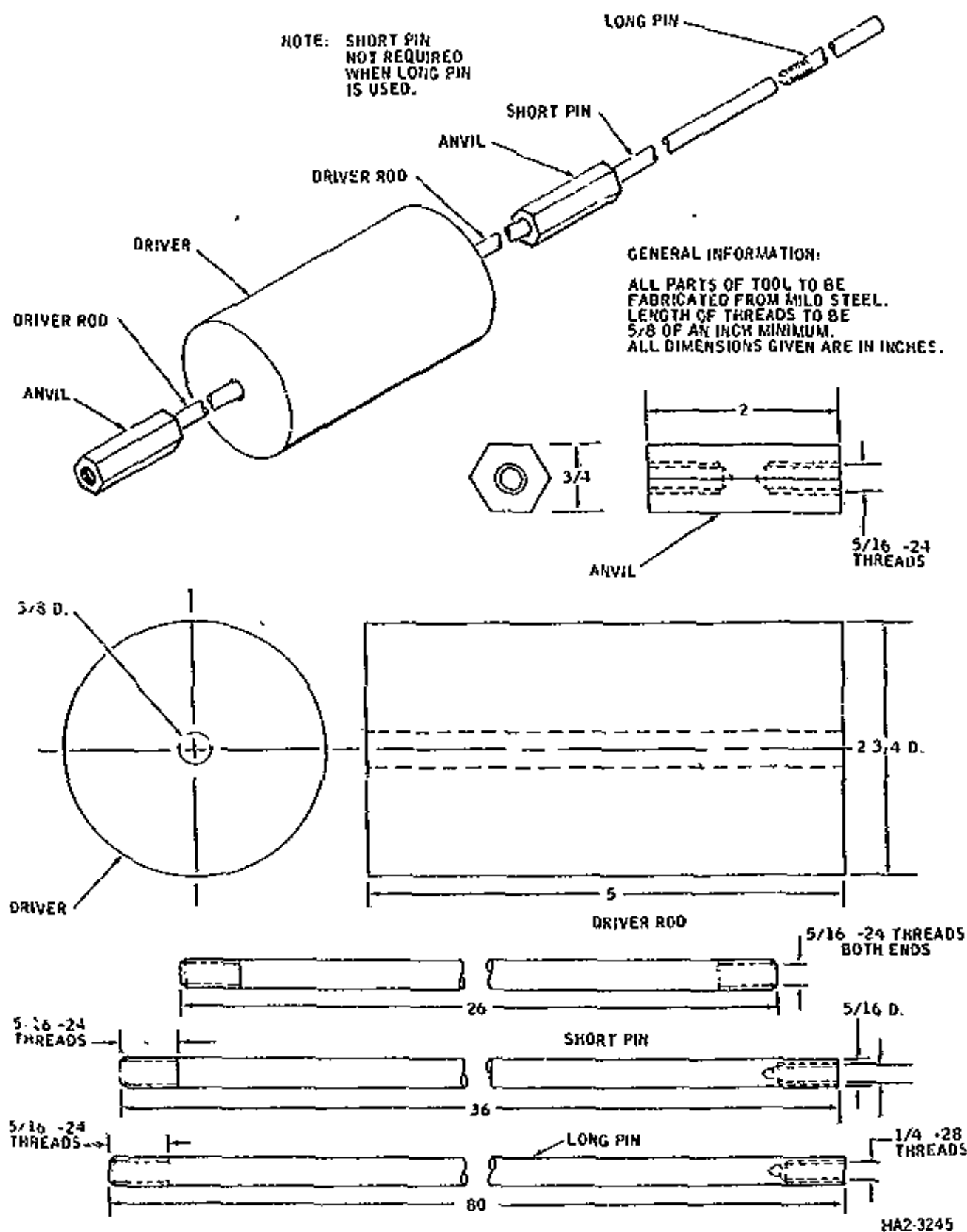
CAUTION: EXERCISE CARE WHEN REMOVING HINGE PINS TO AVOID DAMAGE TO FUSELAGE AND DOOR SKINS.

NOTE: Due to the proximity of the hinge pins to the fuselage skin the pins may be difficult to remove. To facilitate removal, a tool may be fabricated as shown in Figure 402 and the pins removed as shown in Figure 403.

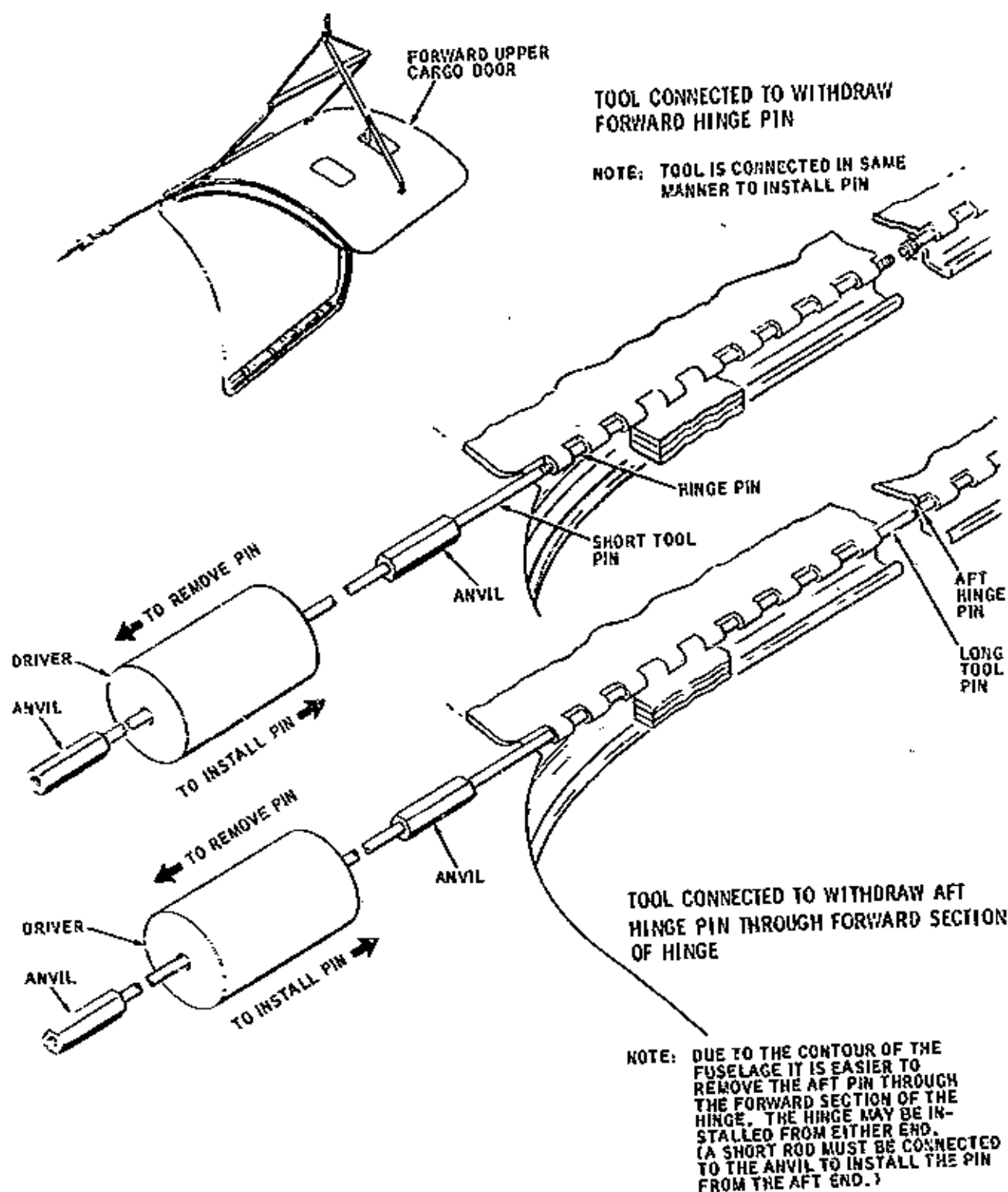
- (13) Remove door.

CAUTION: EXERCISE CARE WHEN REMOVING DOOR TO PREVENT DAMAGE TO SWIVEL GLANDS.

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Forward Upper Cargo Door Hinge Pins - Removal and Installation  
Figure 403

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**B. Install Forward Upper Cargo Door**

- (1) Check that auxiliary hydraulic pump and cargo door hydraulic control circuit breakers on EPC circuit breaker panel are open.
- (2) Attach sling (C652-5772790) to door.
- (3) Connect a hoist to sling and lift door into position and install hinge pins.

**CAUTION:** EXERCISE CARE WHEN INSTALLING HINGE PINS TO PREVENT DAMAGE TO FUSELAGE AND DOOR SKINS.

**NOTE:** If a new door is being installed it might be necessary to trim the door skin at top of door adjacent to the ends of the hinge half for approximately three inches to permit installation of the hinge pins.

**NOTE:** Due to the proximity of the hinge pins to the fuselage skin the pins may be difficult to install. To facilitate installation a tool may be fabricated as shown in Figure 402 and the pins installed as shown in Figure 403.

- (4) Install and safety nuts on hinge pins. Nuts must not turn after cotter pins are installed.
- (5) If a new door is being installed it must be trimmed to fit door opening. Trim door so that gap between forward, aft, and lower edges of door and doorjamb skins is  $3/16 (+1/32)$  inch.

**CAUTION:** EXERCISE CARE WHEN TRIMMING DOOR TO PREVENT DAMAGE TO PRESSURE SEAL ON DOOR.

**NOTE:** The  $3/16 (+1/32)$  inch tolerance is a nominal value. Exceeding the tolerance (if unavoidable) is permissible provided the door seals properly. However, the door should be trimmed as close as possible to the tolerance for appearance and aerodynamic smoothness of the fuselage.

- (6) Position rain seal on seal depressor and install seal retainers.

**NOTE:** Perform step (6) with the door held open approximately 86 degrees.

- (7) Install jumper cable between electrical connectors on upper edge of door and doorjamb.
- (8) Install swivel gland supports.
- (9) Connect hydraulic lines to swivel glands.
- (10) Install bolts attaching actuating links to doorjamb.

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- (11) Remove sling.
- (12) Lubricate door (see Chapter 12).
- (13) Check door adjustments (see Inspection/Check). If a new door is being installed, or adjustments changed on door removed, it must be adjusted (see Adjustment/Test).
- (14) Test door operation (see Adjustment/Test).

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3. Forward Upper Cargo Door Adjustment/Test

CAUTION: DO NOT TOW OR TAXI AIRPLANE WITH FORWARD UPPER CARGO DOOR OPEN OR UNLATCHED. DO NOT OPEN CARGO DOOR IF ACTUAL OR ANTICIPATED WIND VELOCITY WILL EXCEED 40 KNOTS, EXCEPT UNDER FOLLOWING CONDITIONS:

- (1) CARGO DOOR MAY BE OPENED TO 86 DEGREE OR 166 DEGREE POSITIONS WITH MAXIMUM WIND VELOCITY OF 40 KNOTS (STEADY) OR GUSTS TO 52 KNOTS.
- (2) IF WIND VELOCITIES FROM 40 TO 65 KNOTS ARE ANTICIPATED CARGO DOOR MAY BE OPENED TO 86 DEGREE POSITION ONLY IF AIRPLANE IS PARKED SO WIND DIRECTION IS AGAINST RIGHT SIDE OF AIRPLANE.

WIND VELOCITIES GREATER THAN 40 KNOTS DIRECTED AGAINST LEFT SIDE OF AIRPLANE WILL BLOW CARGO DOOR FROM 86 DEGREE POSITION TO FULL OPEN OR BEYOND THEREBY CAUSING DAMAGE TO FUSELAGE/CARGO DOOR.

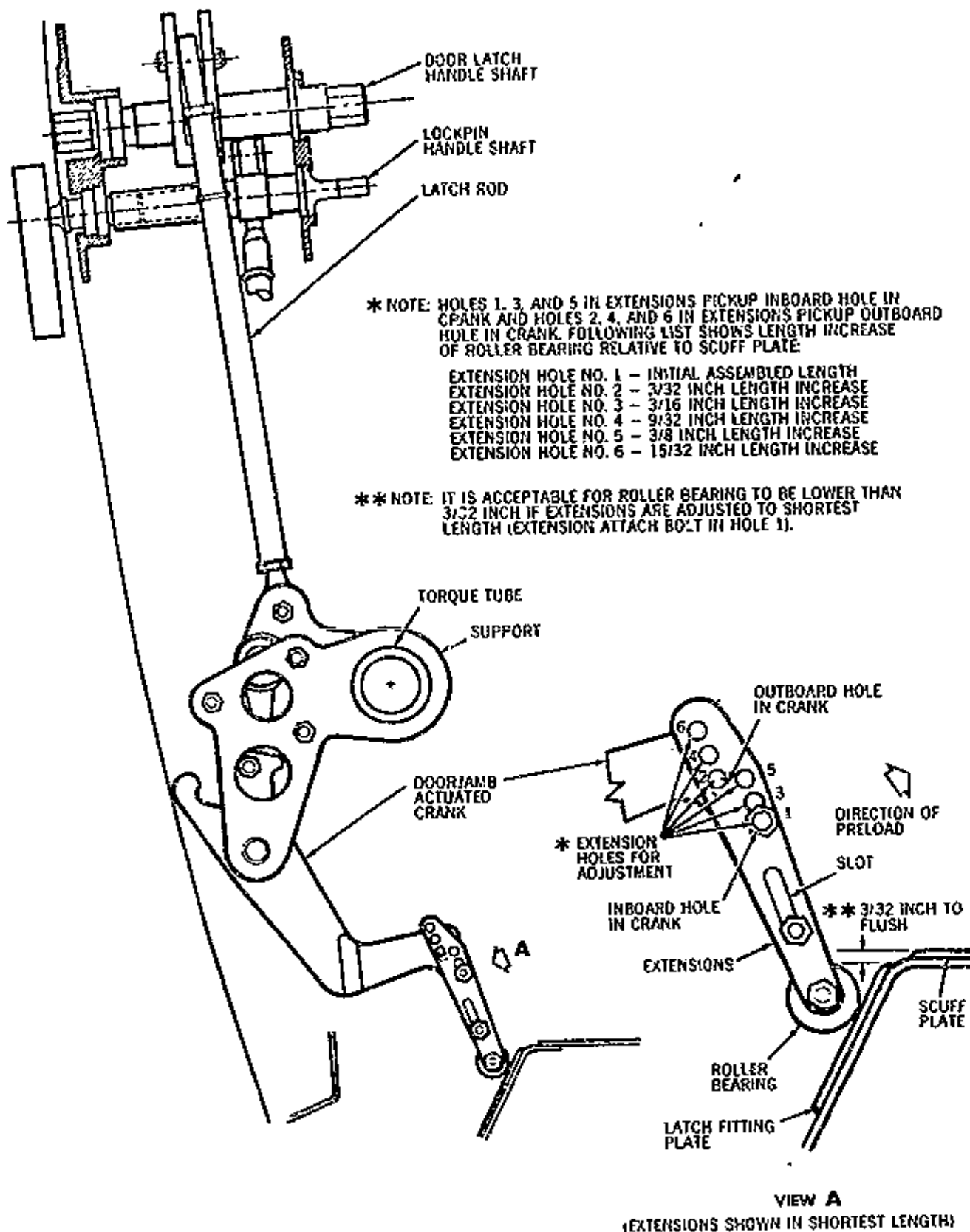
A. Forward Upper Cargo Door Adjustment

- (1) Open auxiliary hydraulic pump and cargo door hydraulic control circuit breakers on electrical power center circuit breaker panel.

WARNING: TAG AND SAFETY CIRCUIT BREAKERS.

- (2) Adjust doorjamb actuated latch crank, as follows:
  - (a) Using manual controls on cargo door, unlatch door.
  - (b) With cargo door partially open, preload crank toward unlatched position (using hand pressure or equivalent) to remove linkage play in latch mechanism. With crank preloaded, close cargo door very slowly until crank extension roller bearing just contacts latch fitting plate on doorjamb. Top of roller bearing should be flush or within  $3/32$  inch below upper surface of scuff plate on doorjamb. If roller bearing is not within tolerance, adjust length of crank extensions (see Figure 501). It is acceptable for roller bearing to be lower than  $3/32$  inch if extensions are adjusted to shortest length.
- (3) Using a torque wrench attached to hex end of door handle shaft to operate door latches, close and latch door (latches are closed and overcenter when black and white strips on latches are in alignment). If torque required to latch door exceeds 187 foot pounds, proceed with step (4), if torque does not exceed 187 foot pounds proceed with step (11). If torque is excessive, check installation of pressure seal on door and seal depressor on doorjamb; and check that spools in latch fittings rotate freely, before proceeding with step (4). A damaged seal depressor or tight seal could increase torque required to latch and unlatch door.

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Doorjamb Actuated Latch Crank -- Adjustment  
 Figure 501

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- (4) Loosen fasteners securing latch mechanism guards and open guards.
- (5) Open door far enough for latches to clear spools on doorjamb.
- (6) Remove spools from No. 2, 3, 4, 5, and 6, spool fittings.
- (7) Close and latch door. If torque exceeds 5 foot-pounds, proceed with step (8), if torque is not exceeded proceed with step (11).
- (8) Shim No. 1 and No. 4 latch assemblies and spool fittings as required so torque required to latch and unlatch door does not exceed 5 foot-pounds. See step (9) substeps (a) through (f).

NOTE: When shimming the door latches it must be remembered that the latches fair the door with the fuselage. Mismatch of the door with the fuselage is not critical provided the door seals when the airplane is pressurized and is weather sealed when unpressurized.

- (9) Adjust No. 2 through No. 6 latch assemblies in order as follows (see Figure 502):
  - (a) Temporarily install spool in fitting with a short rod or bolt approximately 1/2 inch in diameter.
  - (b) Check alignment of holes in fitting with hole in spool with door closed and latched.

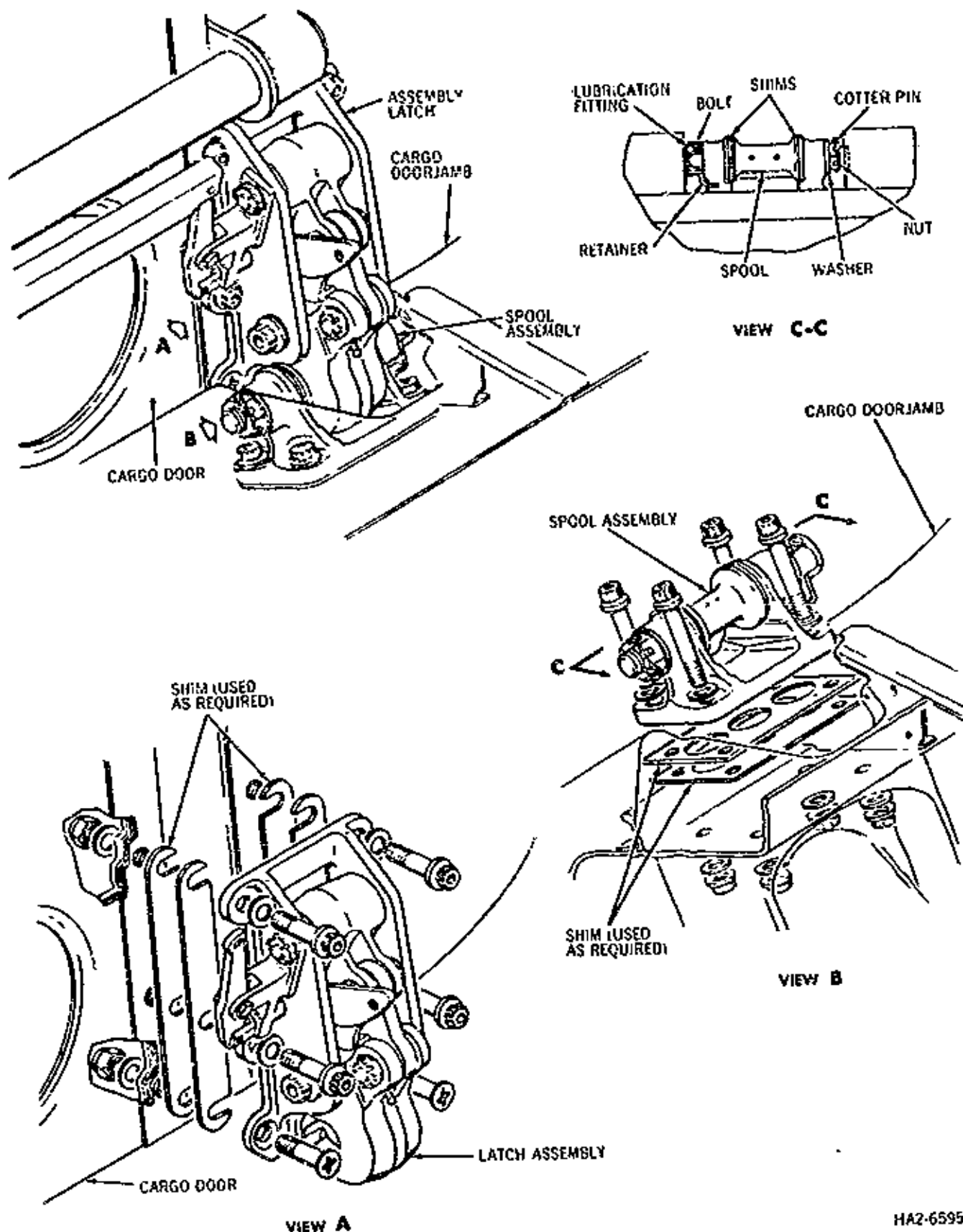
NOTE: It will be necessary to use a mirror to see the holes.

- (c) Shim spool fitting and latch assembly as required to align hole in spool with holes in spool fitting.

NOTE: Check the latching torque as each latch and spool fitting is shimmed. The torque value will increase considerably as each latch is shimmed. The door is bowed outward slightly in the center, this must be considered during the shimming process.

- (d) Install shims between spool ends and spool fitting to center spool in latch (see Figure 503).
  - (e) Install spool attach bolt, washer, retainer, and nut and insure 0.006 to 0.015 (maximum) clearance at ends of spool to permit free rotation. Nut to be installed fingertight and may be backed off 1/6 turn (maximum) to install cotter pin. Install bolt with lubrication fitting in up position.
  - (f) Lubricate spools (see Chapter 12).
  - (g) Check that when latch is closed black and white strips on latch assembly are in alignment. If strips are not in alignment check shimming and short rod connecting latch to torque tube. Black and white strips must be in alignment when latch is closed.

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Forward Upper Cargo Door Latches -- Adjustment  
 Figure 502

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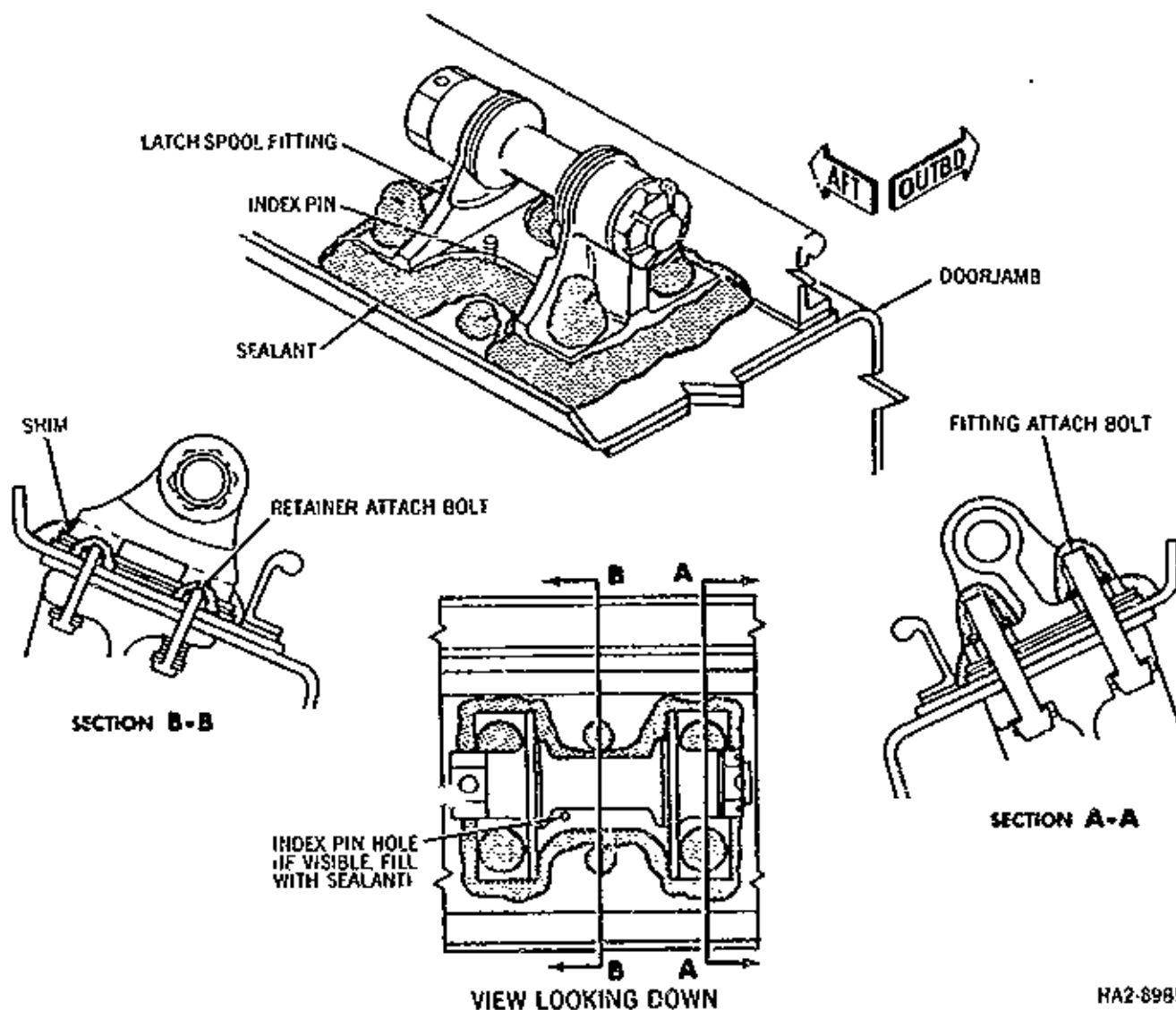
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TO OBTAIN OUTBOARD ADJUSTMENT, MOVE SPOOL FITTING AND UPPER SHIM IN THE DIRECTION AND INCREMENTS NOTED. EACH INCREMENT IS EQUAL TO ONE SERRATION. INBOARD ADJUSTMENT MAY BE ACCOMPLISHED BY REVERSING THE ABOVE PROCEDURE.

ADJUST- MENT	MOVEMENT FITTING OUTBD INBD ← →	MOVEMENT SHIM OUTBD INBD ← →	ADJUST- MENT	MOVEMENT FITTING OUTBD INBD ← →	MOVEMENT SHIM OUTBD INBD ← →
0071	2 →	← 3	0714	0 →	← 2
0143	1 →	← 1	0786	3 →	← 2
0214	1 →	← 2	0857	1 →	← 1
0286	2 →	← 2	0928	1 →	← 4
0357	0 →	← 1	100	2 →	← 0
0428	2 →	← 4	1071	0 →	← 3
050	1 →	← 0	1143	3 →	← 1
0571	1 →	← 3	1214	1 →	← 2
0643	2 →	← 1			

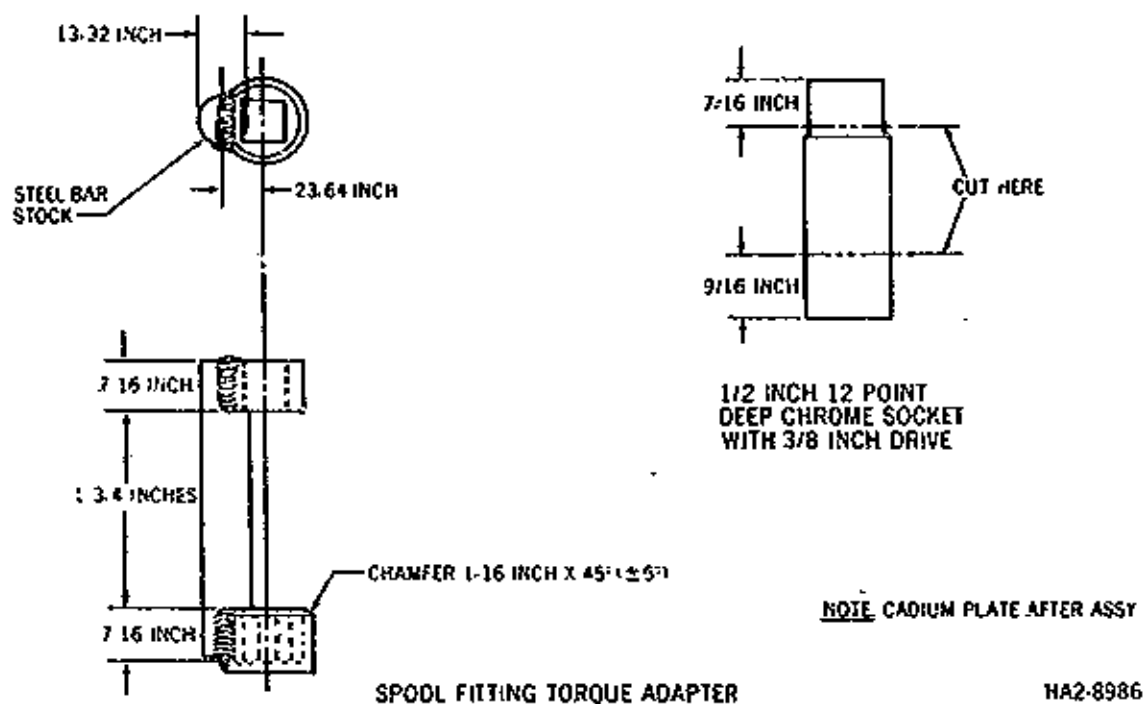


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- (10) When final adjustment of spools and spool fittings is accomplished, provide corrosion protection for each fitting as follows:
- (a) Loosen one nut on spool fitting attach bolt sufficiently to provide access to void around fitting attach bolt.
  - (b) Fill void around bolt with Parker-Q-lube lubricant compound. Tighten nut.
  - (c) Repeat steps (a) and (b) for remaining spool fitting attach bolts. Do not remove nut from more than one bolt per fitting at any time.
  - (d) Torque spool fitting attach nuts 550 to 600 inch-pounds (see figure 504).
  - (e) Thoroughly clean exposed portions of bolts, nut, washers, (as applicable) and fitting with stiff bristle brush and 1,1,1 trichloroethane. If necessary, dry recesses with compressed air, otherwise wipe dry with clean wiper.
- WARNING:** 1,1,1 TRICHLOROETHANE CONTAINS CHLORINATED HYDROCARBON, VAPOR TOXIC. AVOID PROLONGED OR REPEATED BREATHING OF VAPOR. USE ONLY WITH ADEQUATE VENTILATION. AVOID CONTACT WITH SKIN, EYES, AND CLOTHING. KEEP CONTAINER CLOSED WHEN NOT IN USE. DO NOT TAKE INTERNALLY.
- (f) Cover nuts, washers, and upper ends of fitting attach bolts with sealant.
  - (g) Cover nuts, washers, and upper ends of retainer attach bolts with sealant.
  - (h) Apply fillet of sealant along base of fitting and doorjamb, bridging all shims.
  - (i) If hole for index pin is visible in spool fitting base, fill hole with sealant.
- (11) Disconnect all short rods connecting latches to torque tube.
- (12) Disconnect latch rod from crank on door handle control shaft.
- (13) Screw adjustment rod on mechanically operated check valve in until bottomed.
- (14) Disconnect lines to fittings on door actuating cylinder and install pressure caps on lines.
- CAUTION:** DO NOT INSTALL PRESSURE CAPS ON FITTINGS ON CYLINDER. DO NOT ALLOW FLUID IN CYLINDER TO LEAK ON DOOR STRUCTURE WHEN DOOR IS ACTUATED.
- (15) Place door control handle in operate and close positions, and using hand pump to supply pressure fully extend piston rod of latch cylinder.



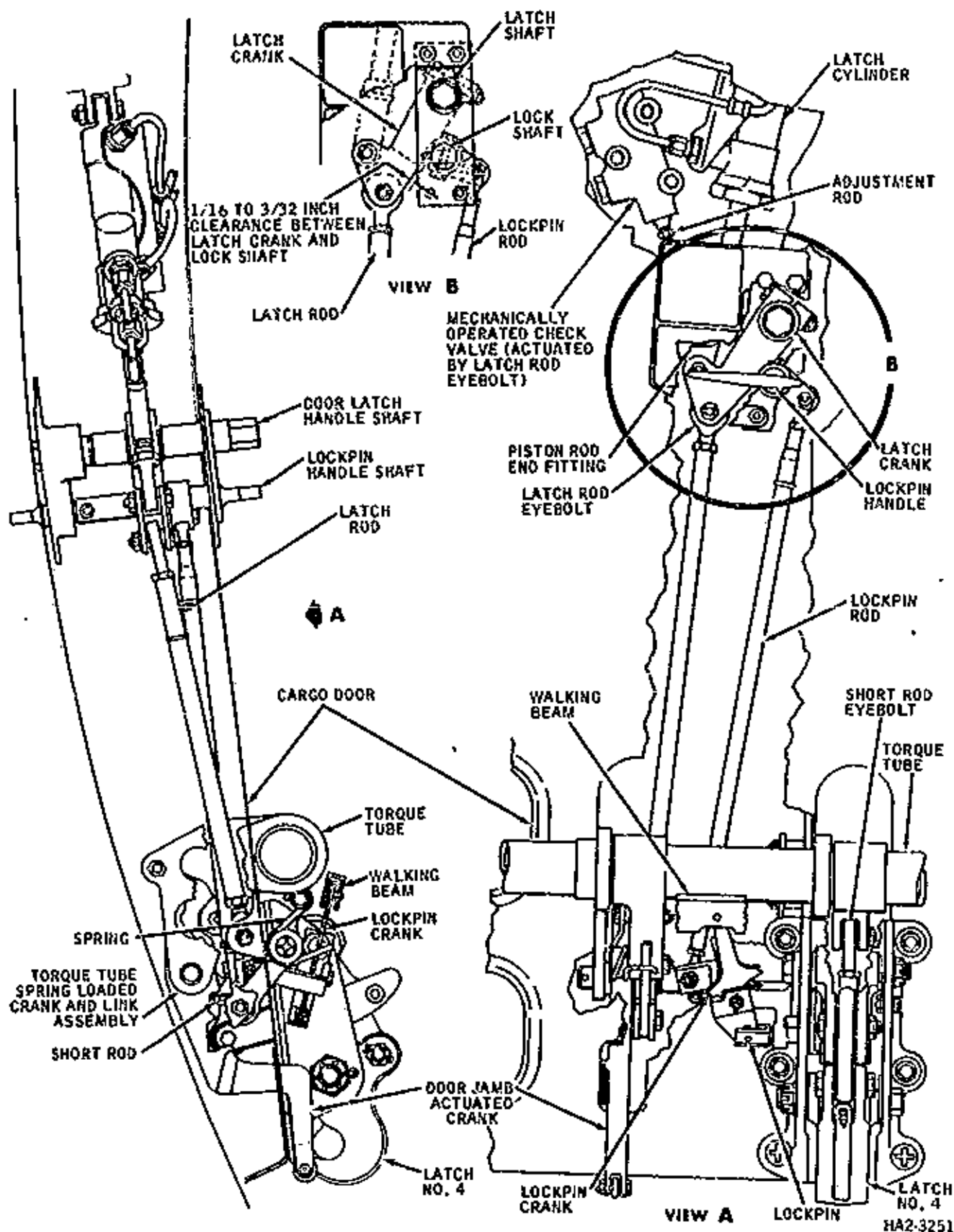
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- (16) Adjust piston rod end fitting of latch cylinder to position crank on door handle shaft within 1/32 to 1/16 of an inch from lockpin handle control shaft.
- (17) Place door control handle in operate and open positions and fully retract latch cylinder piston rod.
- (18) With torque tube spring-loaded crank and link in overcenter position, adjust latch rod to permit free insertion of pivot bolt. Install pivot bolt.
- (19) Manually open door far enough to allow latches to clear spools on doorjamb.
- (20) Unlock overcenter link and crank by pushing on doorjamb actuated crank.
- (21) Place door control handle in operate and close positions and fully extend piston rod of latch cylinder.
- (22) Manually close all latches to overcenter position (black and white strips in alignment), then adjust each latch as follows (see Figure 505):
  - (a) Insert lockpin in latch.
  - (b) Adjust turnbuckle of short rod to permit free insertion of pivot bolt.
  - (c) Adjust turnbuckle to shorten rod until lockpin is tight. Back off turnbuckle 1/16 turn (approximately) to free lockpin. Secure turnbuckle with jamnuts. Check that lockpin is free, if not readjust turnbuckle.
- (23) With all latches adjusted, check operation of lockpins with manual control on door, lockpins must freely engage latches when control handle is released from unlock position. Lockpin for No. 6 latch must bottom on its shoulder.
- (24) Place door control handle in operate and open positions and fully retract piston of latch cylinder.
- (25) Adjust rod and bolt of mechanically operated check valve to contact latch rod eyebolt.
- (26) Place door control handle in operate and close positions and extend latch cylinder piston.
- (27) Adjust rod end bolt of mechanically operated check valve to lengthen rod 3/16 to 1/4 of an inch. Tighten jamnut and safety with lockwire.
- (28) Connect lines to door actuating cylinder.
- (29) Loosen jamnut on piston of door actuating cylinder.

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Forward Upper Cargo Door Latch Mechanism — Adjustment  
 Figure 505

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- (30) Place door control handle in operate and close positions and close and latch door.
- (31) Relieve pressure in door actuating cylinder by rotating door control handle to open and close positions with door control handle in lock position.
- (32) Remove bolts attaching actuating links to door structure.
- (33) Place door control handle in operate and close positions and fully extend piston of actuating cylinder.
- (34) Adjust piston rod of actuating cylinder to permit free insertion of actuating link bolts.
- (35) Screw piston rod out of eyebolt 1 1/2 turns to preload door, then adjust rod to pick up closest key slot.

NOTE: The bolts attaching the actuating links to the doorjamb may be removed to adjust the preload, and the door opened far enough to permit installation of the link bolts after adjustment.

- (36) Install bolt attaching actuating links to door structure.
- (37) Torque jamnut on actuating cylinder piston to 127 (+6) foot-pounds, and safety with lockwire.
- (38) With door closed and latches overcenter (black and white strips in alignment) adjust lockpin cylinder piston rod to disengage lockpins when door control handle is placed in operate position, and to permit spring-loaded walking beam to engage lockpins when door control handle is returned to lock position.
- (39) With door closed and latches overcenter and lockpins fully engaged in latch assemblies, adjust rod between walking beam and crank on lockpin handle control shaft to fair outside handle within 2 degrees.
- (40) Tighten all jamnuts, cotter pin all castellated nuts, and close all access doors.

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- R (41) Check door mechanisms (see Inspection/Check).
- R (42) Test door operation (see paragraph 3, 9).

8. Forward Upper Cargo Door Functional Test

(1) Functional Test - Normal Hydraulic System

- (a) Close auxiliary hydraulic pump control, cargo door hydraulic control, and cargo door hydraulic shutoff control circuit breakers on EPC circuit breaker panel.
- (b) Open door control valve access door. Place CARGO DOOR ISOLATION VALVE switch in ON position.
- (c) Lift door control handle from stowed position, then pull handle up to operate position and hold. Check for following operation/condition.

WARNING: TO PREVENT POSSIBLE INJURY TO PERSONNEL OR DAMAGE TO AIRPLANE MAKE CERTAIN THAT ALL HYDRAULICALLY ACTUATED SYSTEMS ARE IN A SAFE CONDITION BEFORE ACTUATING CARGO DOOR HYDRAULIC CONTROL VALVE HANDLE.

- 1) Auxiliary hydraulic pump energized.
- 2) Lockpins disengage from latches.

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- (d) With control handle in operate position rotate handle to open position. Allow handle to return to spring-loaded lock (down) position when door is open 86 degrees (first detent of hold open hook). Check for following operation/condition.
- 1) Latches open.
  - 2) Check valve actuated by latch linkage to port fluid to door actuating cylinder.
  - 3) Door opens.
  - 4) Latching mechanism links go to overcenter position.
  - 5) Auxiliary hydraulic pump deenergized when handle returns to lock position.
  - 6) Door stationary when auxiliary hydraulic pump deenergized.
  - 7) Cargo door warning lights in flight compartment come on when door is unlatched.
- (e) With control handle in down (lock) position rotate handle to close position. Check for following operation/condition.
- 1) Door closes until hold-open hook detent at 86 degree position engages roller of hold open mechanism.
  - 2) Door held in open position by hold-open hook.
- (f) With control handle in operate position, rotate handle to open position and hold until door is open to 166 degree position (second detent of hold-open hook).
- (g) With control handle in lock position, visually check that roller of hold-open mechanism has moved into position to engage hold-open hook.
- NOTE: At the 166 degree position the roller will move into the hold position, but the door will not settle on the roller.
- (h) With control handle in operate position, rotate handle momentarily to open to lift door off hold-open hook.
- (i) With control handle in operate position, rotate handle to close position. Check for following operation/condition.
- 1) Auxiliary hydraulic pump energized.
  - 2) Roller of hold-open mechanism rotated to allow hold-open hook to pass over roller.

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- 3) Door closes.
  - 4) Arm of latch mechanism contacts doorjamb to move latch assembly links from overcenter position.
  - 5) Latches engage spools on doorjamb.
  - 6) Black and white strips on latch assemblies are in alignment.
- (j) Allow control handle to return to spring-loaded lock position. Check for following operation/condition.
- 1) Lockpins engage latches.
  - 2) Auxiliary hydraulic pump deenergized.
  - 3) Cargo door warning lights in flight compartment go off.
- (k) Place control handle in stowed position, place CARGO DOOR ISOLATION VALVE switch in OFF position, and close access door.

(2) Functional Test - Hand Pump Hydraulic System

- (a) Open auxiliary hydraulic pump control and cargo door hydraulic control circuit breakers on EPC circuit breaker panel.

WARNING: TAG AND SAFETY CIRCUIT BREAKERS.

- (b) Using hand pump to supply hydraulic pressure perform test for normal hydraulic system as outlined in paragraph 2, B, (1). Omit items pertaining to operation of auxiliary hydraulic pump.
- (c) Close auxiliary hydraulic pump control and cargo door hydraulic control circuit breakers on EPC circuit breaker panel.

(3) Functional Test - Manual Operation

- (a) Rotate lock handle on door to unlocked position. Lockpins should disengage from latches.

R

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- R (b) With lock handle held in unlocked position rotate door latch handle shaft to open position. Latches should open.

NOTE: The hand pump handle may be used as a wrench to latch and unlatch the door.

- R (c) Pull door closed and rotate door latch handle shaft to closed position. Latches should close and lockpins should engage latches.

NOTE: The door control handle must be placed in the close position to relieve pressure trapped in the system to open or close the door manually.



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FORWARD UPPER CARGO DOOR - INSPECTION/CHECK

1. General

- A. The following procedures will assure that the forward upper cargo door is operating correctly. If item being checked fails to meet the requirements specified, the discrepancy should be corrected to assure satisfactory operation of the door.

2. Forward Upper Cargo Door Inspection/Check

A. Forward Upper Cargo Door Check

- (1) Using hand pump or manual controls on door, close and latch door.
- (2) Relieve cargo door hydraulic system. Place CARGO DOOR ISOLATION VALVE switch in ON position and rotate door control handle to open and close positions several times with control handle in lock position. Place CARGO DOOR ISOLATION VALVE switch in OFF position.
- (3) Check that torque required to latch and unlatch door does not exceed 187 foot-pounds (200 psi maximum hydraulic pressure).

NOTE: The torque may be checked by attaching a torque wrench to the hex end of the latch mechanism shaft.

- (4) Check for 3/16 (+1/32) inch clearance between edge of door skin and fuselage skin.

NOTE: The tolerance is a nominal value. Exceeding the tolerance is permissible provided the door latches and seals properly. However, exceeding these tolerances may affect the aerodynamic smoothness of the fuselage.

- (5) Check that black and white strips on each latch assembly are in alignment.
- (6) Rotate lock handle on door to unlock position.
- (7) Allow lockpin handle to rotate to locked position. Spring force only should engage lockpins.
- (8) Check that all lockpins engage lockplates 3/16 of an inch minimum, with lockpin at No. 6 latch bottomed.
- (9) Rotate lock handle in unlocked direction and check that door warning lights in flight compartment come on with 1/8 of an inch minimum engagement of No. 6 latch lockpin with lockplate.

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- (10) Open auxiliary hydraulic pump and cargo door hydraulic control circuit breakers on EPC circuit breaker panel.

WARNING: TAG AND SAFETY CIRCUIT BREAKERS.

- (11) Place cargo door isolation switch on control panel to ON position.
- (12) Using hand pump to supply pressure, and control handle to control operation of door, check operation of door. Door should open and close smoothly and remain open at any position (subject to normal valve leakage) until control handle is placed in operate and close positions and pressure applied.
- (13) Check operation of hold-open mechanism. Mechanism should hold door open approximately 86 to 166 degrees without hydraulic pressure, and release when pressure is applied to close door.

NOTE: To close the door without hydraulic pressure the overcenter links of the hold-open mechanism must be manually tripped from the overcenter position.

- (14) Close auxiliary hydraulic pump and cargo door hydraulic control circuit breakers on EPC circuit breaker panel.
- (15) Using auxiliary hydraulic pump to supply pressure, check operation of door. Door should open and close smoothly.

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FORWARD UPPER CARGO DOOR LATCHES - REMOVAL/INSTALLATION

1. General

- A. The latches are numbered from one to seven, starting at the forward end of the door. The removal and installation procedures for all of the latches are identical. The door must be open and the latches in the latched position to remove and install the latches.

2. Forward Upper Cargo Door Latches Removal/Installation

A. Remove Forward Upper Cargo Door Latches

- (1) Open auxiliary hydraulic pump and cargo door hydraulic control circuit breakers on EPC circuit breaker panel.

WARNING: TAG AND SAFETY CIRCUIT BREAKERS.

- (2) Relieve pressure in cargo door hydraulic system. Place CARGO DOOR ISOLATION VALVE switch in ON position and rotate door control valve handle to open and close positions with control handle in lock (valve shaft in spring-loaded down position) until pressure is dissipated. Place CARGO DOOR ISOLATION VALVE switch in OFF position.

- (3) Using controls on door unlock and unlatch door.

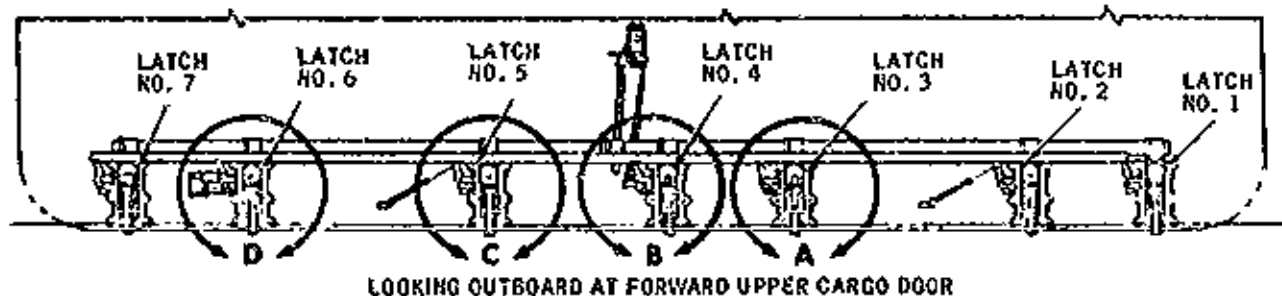
CAUTION: TO PREVENT POSSIBLE STRUCTURAL DAMAGE TO AIRPLANE, FORWARD UPPER CARGO DOOR MUST BE CLOSED AND LATCHED WHEN RAISING (JACKING) OR LOWERING AIRPLANE. NO CARGO IS TO BE LOADED OR UNLOADED FROM UPPER CARGO COMPARTMENT WHILE AIRPLANE IS ON JACKS.

NOTE: The forward upper cargo door hydraulic handle pump may be used as a wrench to unlatch the door.

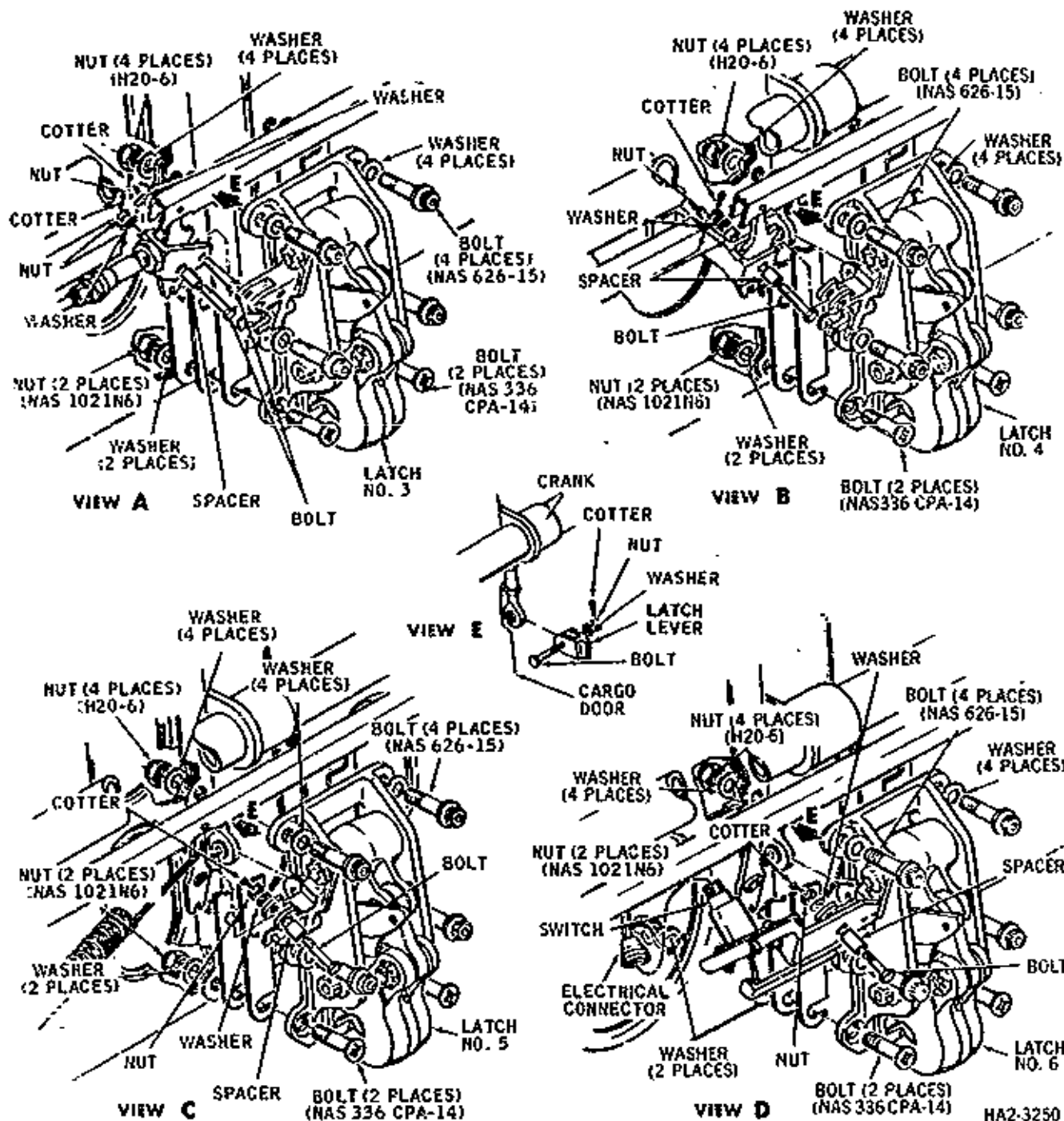
- (4) Manually open door far enough to allow latches to clear spools on doorjamb.
- (5) Unlock overcenter link and crank by pushing on doorjamb actuating crank.
- (6) Using manual controls on door place latches in close position.
- (7) Loosen fasteners on latch mechanism guards and open guards.
- (8) Disconnect springs from No. 2 and No. 5 lockpin cranks.
- (9) Remove access door, for latch to be removed, on outboard side of cargo door.

NOTE: There is an access door for each latch.

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LOOKING OUTBOARD AT FORWARD UPPER CARGO DOOR



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- (10) Disconnect lockpin rod from lockpin crank at No. 4 latch.
- (11) Remove pivot bolt and spacer from lockpin crank of latch being removed.
- (12) Swing crank aft until lockpin is free from latch, and remove lockpin.
- (13) Disconnect latch adjustment rod from eyebolts attaching rod to latch and crank on torque tube.

**NOTE:** It will be necessary to partly open the latch to disconnect the adjustment rod.

- (14) Remove bolts attaching latch to door structure. Retain and record number of shims installed between latch and door structure.
- (15) Remove latch with adjustment rod eyebolt attached.

**B. Install Forward Upper Cargo Door Latches**

- (1) Check that auxiliary hydraulic pump and cargo door hydraulic control circuit breakers on EPC circuit breaker panel are open.
- (2) Place latch and shims, recorded in paragraph 2, A, step (14), in position on door structure and install bolts attaching latch to door structure.

**NOTE:** Place the latch in the locked overcenter position before installation. The latch is in the overcenter position when the black and white strips are in alignment.

- (3) Connect latch adjustment rod to eyebolts attached to torque tube crank and latch.
- (4) Adjust rod to position latch in overcenter position (black and white strips in alignment).
- (5) Connect lockpin to lockpin crank.
- (6) Install spacer and pivot bolt attaching lockpin crank to latch.
- (7) Connect lockpin rod to lockpin crank at No. 4 latch.
- (8) Tighten all jamnuts and cotter key all castellated nuts.
- (9) Close latch mechanism guards.
- (10) Install latch access door.

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FORWARD UPPER CARGO DOOR ACTUATING CYLINDER - MAINTENANCE PRACTICES

1. General

- A. The maintenance practices for the forward upper cargo door consist of removal and installation procedures for the actuating cylinder, and removal and installation procedures for the eyebolt and hold-open mechanism.

2. Forward Upper Cargo Door Actuating Cylinder Removal/Installation

CAUTION: TO PREVENT POSSIBLE STRUCTURAL DAMAGE TO AIRPLANE, FORWARD UPPER CARGO DOOR MUST BE CLOSED AND LATCHED WHEN RAISING (JACKING) OR LOWERING AIRPLANE. NO CARGO IS TO BE LOADED OR UNLOADED FROM UPPER CARGO COMPARTMENT WHILE AIRPLANE IS ON JACKS.

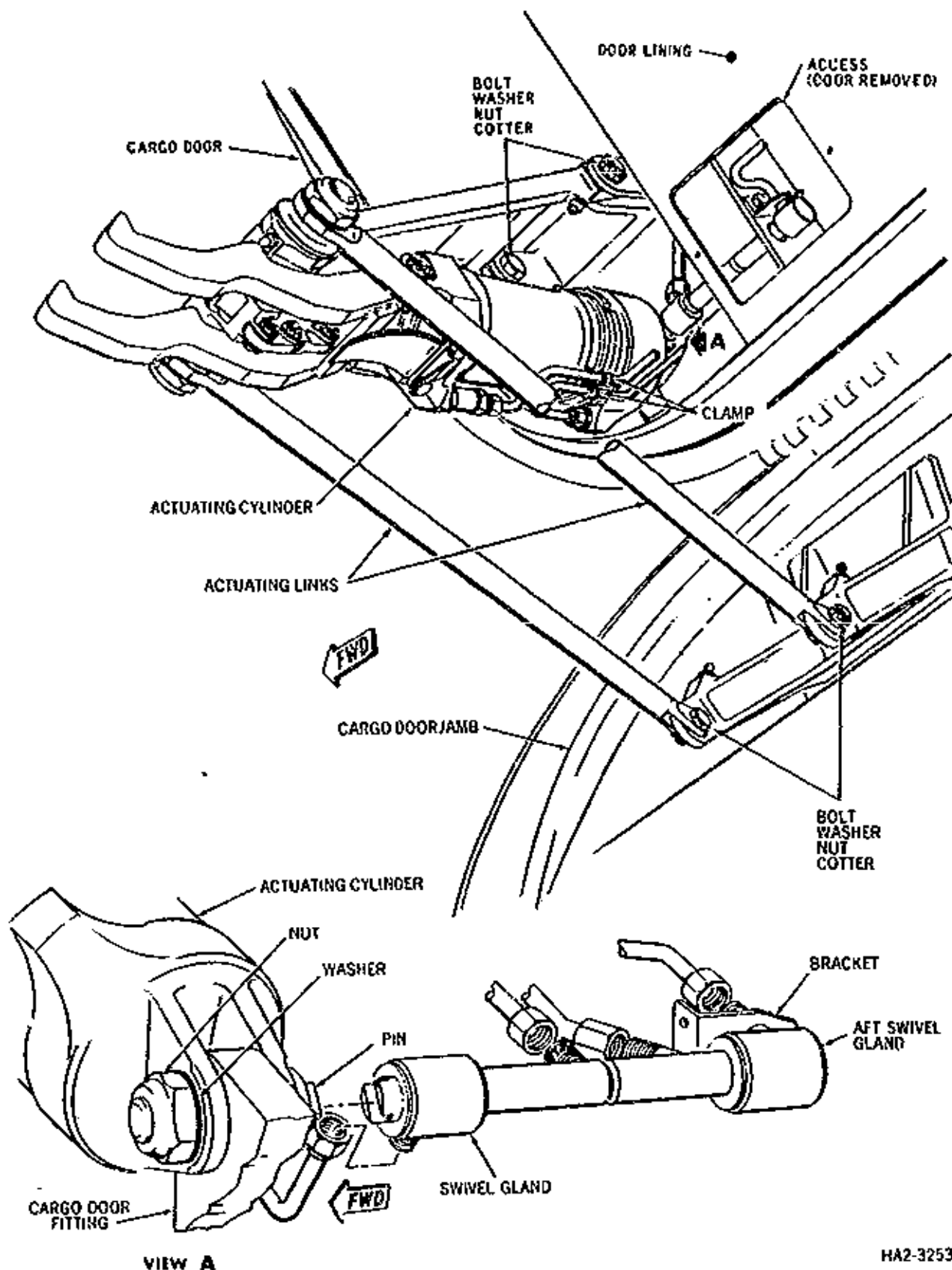
- A. Remove Forward Upper Cargo Door Actuating Cylinder (See Figure 201).

- (1) Open auxiliary hydraulic pump and cargo door control circuit breakers on EPC circuit breaker panel.

WARNING: TAG AND SAFETY CIRCUIT BREAKERS.

- (2) Relieve pressure in cargo door hydraulic system. Place CARGO DOOR ISOLATION VALVE switch in ON position and rotate door control valve handle to open and close positions with control handle in lock (valve shaft in spring-loaded down position) until pressure is dissipated. Place CARGO DOOR ISOLATION VALVE switch in OFF position.
- (3) Remove access door adjacent to actuating cylinder.
- (4) Remove panel covering actuating cylinder.
- (5) Disconnect hydraulic lines on actuating cylinder from swivel glands. Cap lines and swivel glands.
- (6) Loosen bolt securing aft swivel gland bracket to door structure and move bracket and gland aft until forward swivel gland can be detached from actuating cylinder anchor pin.
- (7) Remove bolts attaching door actuating links to door and doorjamb.
- (8) Support cylinder and remove pin anchoring actuating cylinder to door structure.

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Forward Upper Cargo Door Actuating Cylinder -- Installation  
 Figure 201

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**B. Install Forward Upper Cargo Door Actuating Cylinder (See Figure 201).**

- (1) Check that auxiliary hydraulic pump and forward upper cargo door hydraulic control circuit breakers on EPC circuit breaker panel are open.
- (2) Place actuating cylinder in position on door structure and install anchor pin.
- (3) Position actuating links on door structure and doorjamb and install attaching bolts.
- (4) Position swivel gland on actuating cylinder anchor pin and tighten bolts securing swivel gland bracket.
- (5) Connect actuating cylinder hydraulic lines to swivel glands.
- (6) Adjust actuating cylinder eyebolt (see 52-36-1).
- (7) Install access door and panel.

**C. Remove Forward Upper Cargo Door Actuating Cylinder Eyebolt and Hold-Open Mechanism (See Figure 202.)**

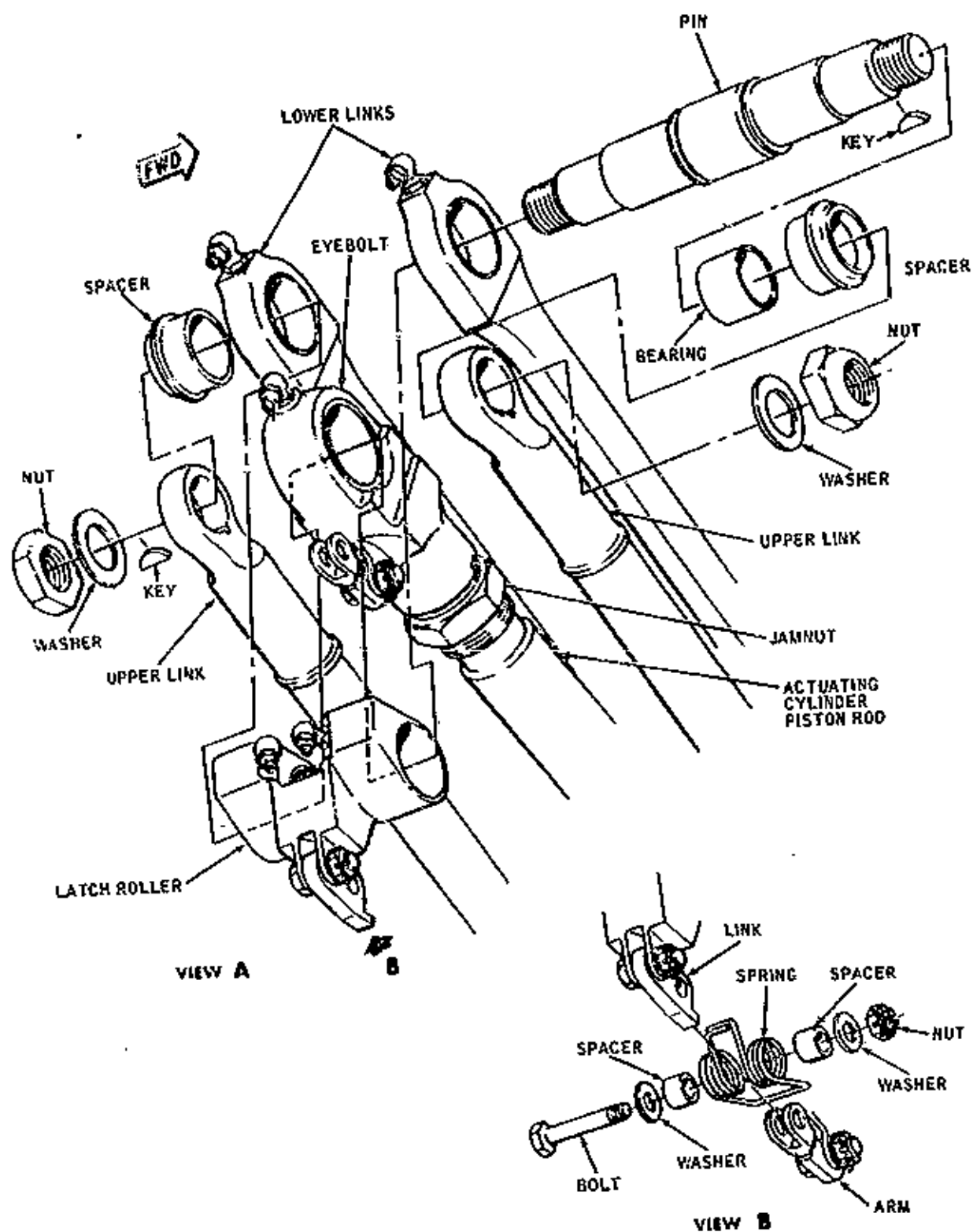
- (1) If actuating cylinder is installed in airplane, remove bolts attaching actuating links to door structure and doorjamb.
- (2) Disconnect bolt attaching overcenter link to roller.
- (3) Manually actuate roller to release hold-open hooks.
- (4) Remove nuts from hold-open mechanism pin.
- (5) Remove right forward link and key.
- (6) Remove right aft link and spacer.
- (7) Remove left aft link and key.
- (8) Remove left forward link and spacer.
- (9) Pull pin and bearing out of eyebolt and roller.
- (10) Loosen jamnut on actuating cylinder piston and remove eyebolt.

**D. Install Forward Upper Cargo Door Actuating Cylinder Eyebolt and Hold-Open Mechanism (See Figure 202.)**

- (1) Install eyebolt on piston of actuating cylinder. Do not tighten jamnut.



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Forward Upper Cargo Door Actuating Cylinder Eyebolt  
 and Hold-Open Mechanism -- Installation  
 Figure 202

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- (2) Position roller to eyebolt and install roller and bearing.
- (3) Connect roller link to roller.
- (4) Install left forward link and spacer.
- (5) Install left aft link and key.
- (6) Install right aft link and spacer.
- (7) Install right forward link and key.
- (8) Install nuts and washers on pin.
- (9) If cylinder is not installed on door, install cylinder (see paragraph 8).
- (10) Install bolts attaching actuating links to door structure and doorjamb.

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FORWARD UPPER CARGO DOOR CONTROL VALVE - MAINTENANCE PRACTICES

1. General

- A. The maintenance practices for the forward upper cargo door control valve consists of removal and installation procedures.

2. Forward Upper Cargo Door Control Valve Removal/Installation

A. Remove Forward Upper Cargo Door Control Valve

- (1) Open auxiliary hydraulic pump and cargo door hydraulic control circuit breakers on EPC circuit breaker panel.

WARNING: TAG AND SAFETY CIRCUIT BREAKERS.

- (2) Open cargo door control handle access door located in floor inboard of passenger forward entrance door.

- (3) Relieve any trapped pressure in cargo door hydraulic system. Place CARGO DOOR ISOLATION VALVE switch in ON position and place door control handle in operate position and rotating handle to open and close positions several times. Place CARGO DOOR ISOLATION VALVE switch in OFF position.

- (4) Open cargo door hydraulic shutoff control circuit breaker on EPC circuit breaker panel.

WARNING: TAG AND SAFETY CIRCUIT BREAKER.

- (5) Remove screws and bolt attaching instruction plate to valve box. Disconnect wiring to isolation valve switch. Remove instruction plate.

- (6) Disconnect hydraulic lines from fittings on valve. Cap lines and fittings.

- (7) Remove bolts attaching valve to box, and remove valve.

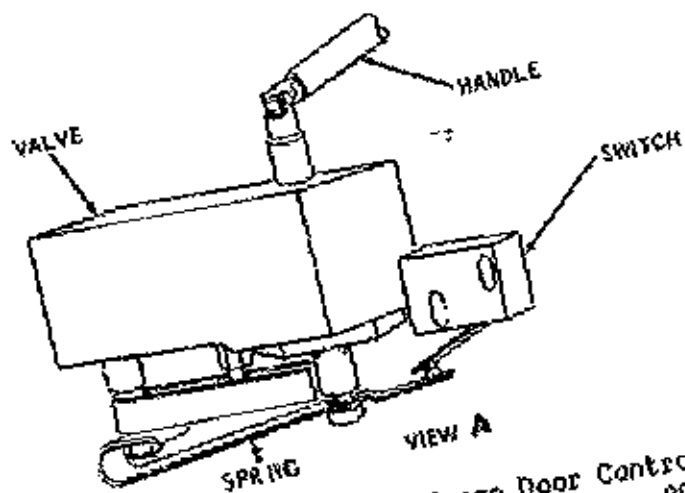
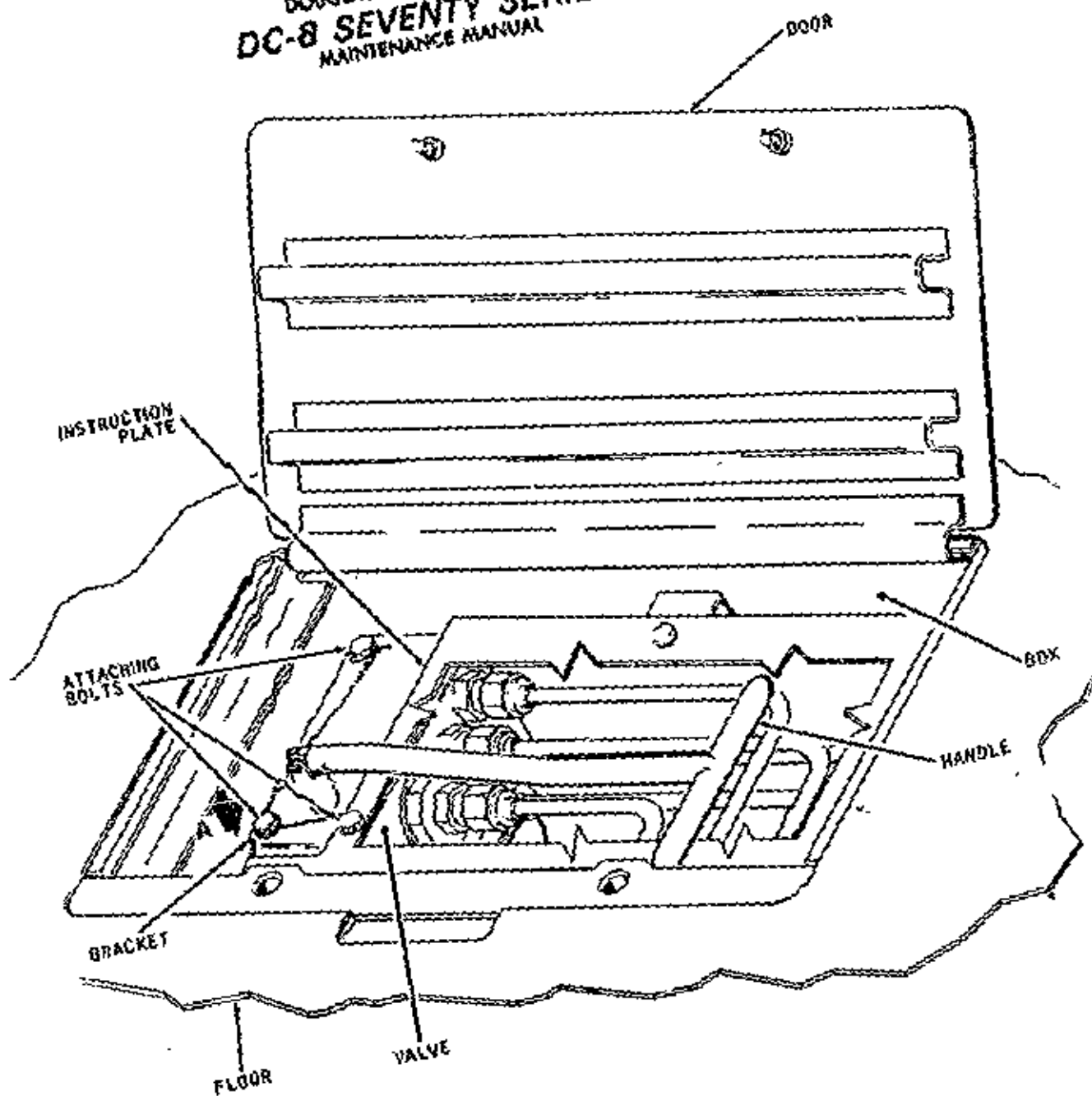
B. Install Forward Upper Cargo Door Control Valve

- (1) Check that auxiliary hydraulic pump, cargo door hydraulic control, and cargo door hydraulic shutoff control circuit breakers on EPC circuit breaker panel are open.

- (2) Place control valve in position in valve box and install two outboard bolts.

- (3) Connect hydraulic lines to fittings on valve.

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Forward Upper Cargo Door Control Valve - Installation  
Figure 201

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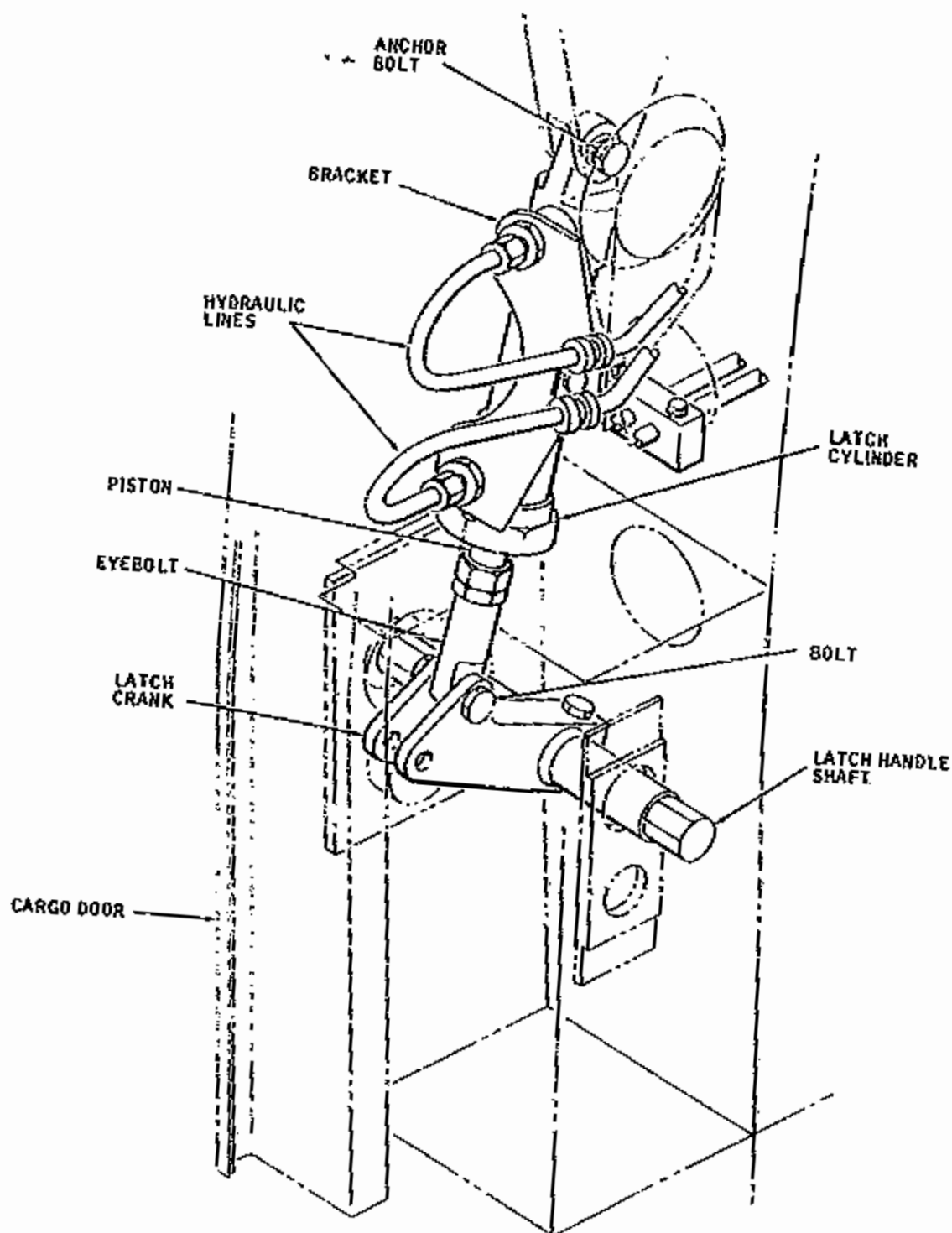
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- (4) Check that pump control switch on valve is actuated when control handle is placed in operate position.

NOTE: To adjust the switch loosen the screws and reposition the switch. Tighten the screws and safety with lockwire.

- (5) Connect wires to isolation valve switch on instruction plate.
- (6) Position instruction plate in valve box and install screws attaching plate to box, and bolts attaching plate to valve and valve to box. Secure valve attaching bolts with lockwire.
- (7) Test cargo door operation (see Adjustment/Test, 52-36-1).
- (8) Close control valve access door.
- (9) Close auxiliary hydraulic pump, cargo door hydraulic control, and cargo door hydraulic shutoff control circuit breakers on EPC circuit breaker panel.

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Forward Upper Cargo Door Latch Cylinder -- Installation  
Figure 201

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- (4) Connect hydraulic lines to fittings on latch cylinder.
- (5) Install clamps securing hydraulic lines to latch cylinder.
- (6) Test cargo door operation (see Adjustment/Test, 52-36-1).
- (7) Install access door.
- (8) Close auxiliary hydraulic pump, cargo door hydraulic control, and cargo door hydraulic shutoff control circuit breakers on EPC circuit breaker panel.

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FORWARD UPPER CARGO DOOR LOCKPIN CYLINDER - MAINTENANCE PRACTICES

1. General

- A. The maintenance practices for the forward upper cargo door lockpin cylinder consists of removal and installation procedures.

2. Forward Upper Cargo Door Lockpin Cylinder Removal/Installation

A. Remove Forward Upper Cargo Door Lockpin Cylinder

- (1) Open auxiliary hydraulic pump and cargo door hydraulic control circuit breakers on EPC circuit breaker panel.

WARNING: TAG AND SAFETY CIRCUIT BREAKERS.

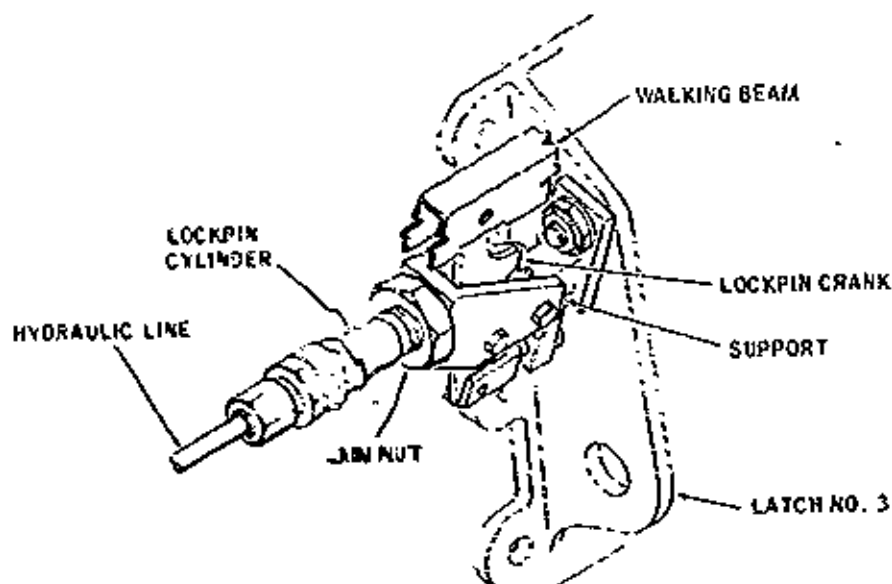
- (2) Open cargo door control handle access door located in floor inboard of passenger forward entrance door.
- (3) Relieve any pressure trapped in cargo door hydraulic system. Place CARGO DOOR ISOLATION VALVE in ON position, place door control handle in operate position and rotate handle to open and close positions several times. Place CARGO DOOR ISOLATION VALVE switch in OFF position.
- (4) Loosen fasteners on latch mechanism forward guard and open guard.
- (5) Disconnect hydraulic line from fitting on lockpin cylinder. Cap line and fitting.
- (6) Loosen jamnut securing lockpin cylinder to cylinder support and remove lockpin cylinder.

B. Install Forward Upper Cargo Door Lockpin Cylinder

- (1) Check that auxiliary hydraulic pump and cargo door hydraulic control circuit breakers on EPC circuit breaker panel are open.
- (2) Install jamnut on threaded end of lockpin cylinder.
- (3) Screw lockpin cylinder into support.
- (4) Adjust cylinder so piston just contacts lockpin crank and tighten jamnut.
- (5) Connect hydraulic line to fitting on cylinder.



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Forward Upper Cargo Door  
Lockpin Cylinder -- Installation  
Figure 201

- (6) Close auxiliary hydraulic pump and cargo door hydraulic control circuit breakers on EPC circuit breaker panel.
- (7) Test operation of cargo door (see Adjustment/Test, 52-36-1).
- (8) Secure latch mechanism guard.

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FORWARD UPPER CARGO DOOR HAND PUMP - MAINTENANCE PRACTICES

1. General

- A. The maintenance practices for the forward upper cargo door hand pump consists of removal and installation procedures.

2. Forward Upper Cargo Door Hand Pump Removal/Installation

A. Remove Forward Upper Cargo Door Hand Pump

- (1) Open auxiliary hydraulic pump and cargo door hydraulic control circuit breakers on EPC circuit breaker panel.

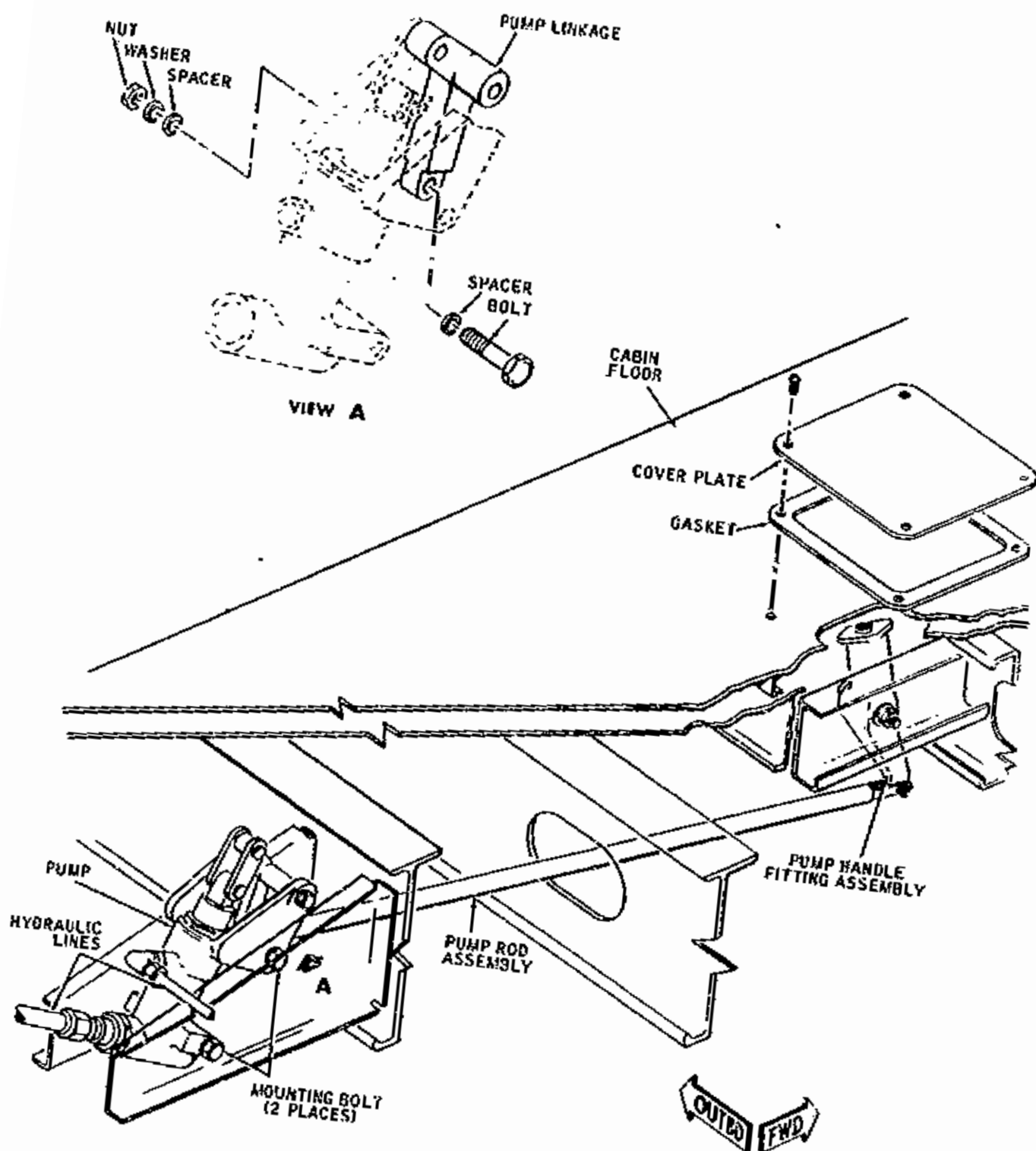
WARNING: TAG AND SAFETY CIRCUIT BREAKERS.

- (2) Open cargo door control handle access door located in floor inboard of passenger forward entrance door.
- (3) Relieve any pressure trapped in cargo door hydraulic system. Place CARGO DOOR ISOLATION VALVE switch in ON position, place door control handle in operate position and rotate handle to open and close positions several times. Place CARGO DOOR ISOLATION VALVE switch in OFF position.
- (4) Pry out access panel in passenger compartment floor just forward of cargo door.
- (5) Disconnect hydraulic lines from fittings on hand pump. Cap lines and fittings.
- (6) Remove bolt and spacer attaching pump rod to pump linkage.
- (7) Remove bolts attaching pump to fuselage structure.

B. Install Forward Upper Cargo Door Hand Pump

- (1) Check that auxiliary hydraulic pump and cargo door hydraulic control circuit breakers on EPC circuit breaker panel are open.
- (2) Place hand pump in position on fuselage structure and install attaching bolts.
- (3) Connect pump rod to pump linkage.
- (4) Connect hydraulic lines to fittings on pump.

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- (5) Close auxiliary hydraulic pump and cargo door hydraulic control circuit breakers on EPC circuit breaker panel.
- (6) Using hand pump to supply pressure test operation of cargo door (see Adjustment/Test, 52-36-1).
- (7) Install access panel.

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FORWARD UPPER CARGO DOOR PRESSURE SEAL - MAINTENANCE PRACTICES

1. General

- A. The forward upper cargo door pressure seal may be removed and installed without removing the door from the airplane. However, if the door was removed for other maintenance the seal should be installed before the door is installed on the airplane. The following procedures apply (omitting the steps that do not apply if door is removed from the airplane) to both conditions.

CAUTION: TO PREVENT POSSIBLE STRUCTURAL DAMAGE TO AIRPLANE, FORWARD UPPER CARGO DOOR MUST BE CLOSED AND LATCHED WHEN RAISING (JACKING) OR LOWERING AIRPLANE. NO CARGO IS TO BE LOADED OR UNLOADED FROM UPPER CARGO COMPARTMENT WHILE AIRPLANE IS ON JACKS.

2. Tools and Equipment Required

NOTE: Equivalent substitutes may be used instead of the following listed items.

Item	Name	Number	Manufacturer	Use
A	Sling	C652-5772790	Douglas Aircraft Co., Inc.	Support cargo door
B	Sealant	3C-401 (Modified)	Churchill Chemical Co.	Seal pressure seal

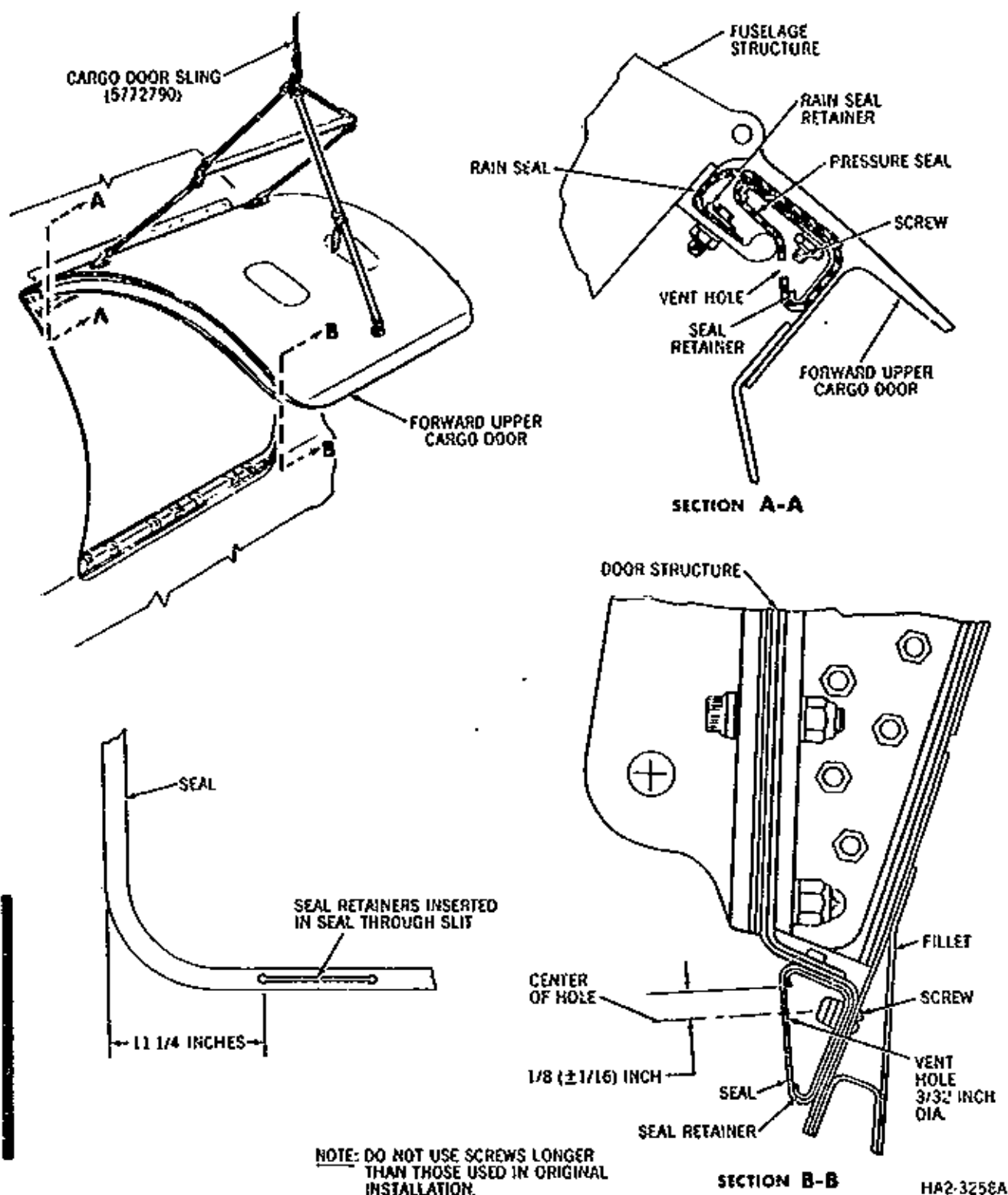
3. Forward Upper Cargo Door Pressure Seal Removal/Installation

CAUTION: DO NOT TOW OR TAXI AIRPLANE WITH FORWARD UPPER CARGO DOOR OPEN OR UNLATCHED. DO NOT OPEN CARGO DOOR IF ACTUAL OR ANTICIPATED WIND VELOCITY WILL EXCEED 40 KNOTS, EXCEPT UNDER FOLLOWING CONDITIONS:

- (1) CARGO DOOR MAY BE OPENED TO 86 DEGREE OR 166 DEGREE POSITIONS WITH MAXIMUM WIND VELOCITY OF 40 KNOTS (STEADY) OR GUSTS TO 52 KNOTS.
- (2) IF WIND VELOCITIES FROM 40 TO 65 KNOTS ARE ANTICIPATED CARGO DOOR MAY BE OPENED TO 86 DEGREE POSITION ONLY IF AIRPLANE IS PARKED SO THAT WIND DIRECTION IS AGAINST RIGHT SIDE OF AIRPLANE.

WIND VELOCITIES GREATER THAN 40 KNOTS DIRECTED AGAINST LEFT SIDE OF AIRPLANE WILL BLOW CARGO DOOR FROM 86 DEGREE POSITION TO FULL OPEN OR BEYOND THEREBY CAUSING DAMAGE TO FUSELAGE/ CARGO DOOR.

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A. Remove Forward Upper Cargo Door Pressure Seal

- (1) Open auxiliary hydraulic pump and cargo door hydraulic control circuit breakers on EPC circuit breaker panel.

WARNING: TAG AND SAFETY CIRCUIT BREAKERS.

- (2) Relieve pressure in cargo door hydraulic system. Place CARGO DOOR ISOLATION VALVE switch in ON position and rotate door control valve handle to open and close positions with control handle in lock (valve shaft in spring-loaded down position) until pressure is dissipated. Place CARGO DOOR ISOLATION VALVE switch in OFF position.

- (3) Using controls on door unlock and unlatch door.

NOTE: The hand pump handle may be used as a wrench to unlatch the door.

- (4) Remove fillet plate from bottom edge of door to gain access to screws securing seal retainers at lower edge of door.
- (5) Remove screws along edge of outer surface of door securing seal retainers.
- (6) Attach sling (C652-5772790) to door.
- (7) Connect a hoist to sling and lift door open to approximately 86 degree position.
- (8) Disconnect jumper from electrical connector on upper section of door.
- (9) Disconnect hydraulic lines in door from swivel glands on upper section of door.
- (10) Remove bolts attaching swivel gland supports to door.
- (11) Remove bolts attaching actuating links to doorjamb.
- (12) Starting at bottom of door, pull seal loose from sealant and remove seal being careful not to distort retainers.

NOTE: To facilitate handling, the retainers may be removed as the seal is pulled from the door.

B. Install Forward Upper Cargo Door Pressure Seal

- (1) Check that auxiliary hydraulic pump and cargo door hydraulic control circuit breakers on EPC circuit breaker panel are open.

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- (2) Check door for chips, metal shavings, sealant, or other particles which could cause abrasion of seal or prevent proper seating of seal against door surface.
- (3) Check condition of fillet seal at splice plates on lower surface of door skin that could allow leakage around seal. If fillet seal is damaged, apply new fillet seal (3C-401).
- (4) Check seal retainers for nicks, scratches, and sharp edges which might damage inside of seal.
- (5) Check seal retainers for proper position on door to ensure that holes in door and nutplates on seal retainers will align.
- (6) Place seal on a flat surface and insert retainers.

**CAUTION:** USE CARE WHEN INSERTING RETAINERS TO PREVENT TEARING OR CUTTING SEAL, AND TO PREVENT BENDING OR DISTORTING RETAINERS.

**NOTE:** A small amount of talcum powder poured into the slits in the seal will assist in installation of the retainers.

- (7) When all retainers are installed, clamp a strip of metal or wood to seal at retainer joints to make it easier to handle seal during installation.
- (8) Open door to approximately 166 degrees.
- (9) Apply a thin layer of sealant (3C-401) to door in area where seal is to be installed to prevent possible leakage between seal and door.
- (10) Position seal on door, locate nutplates on retainers with an ice pick or other suitable tool, and align nutplates at each end of retainers with holes in door. Clamp retainers in place with small c-clamps.

**CAUTION:** MAKE CERTAIN THAT CLAMPS DO NOT HAVE ANY SHARP EDGES THAT COULD DAMAGE SEAL.

- (11) Check that seal fits properly at corners and that seal is not stretched or bunched up at any point.
- (12) Using an ice pick or other suitable tool, cut holes in seal and install attaching screws.

**CAUTION:** USE SCREWS OF SAME LENGTH AS ORIGINALLY INSTALLED. USE OF LONGER SCREWS WILL CAUSE SEAL TO BE PINCHED BETWEEN SCREW AND SEAL DEPRESSOR ON DOORJAMB, THUS PUNCTURING SEAL.



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- (13) When all screws are installed, remove c-clamps.
- (14) If a new seal is being installed drill 3/32 inch vent holes 1/8 inch from retainer and approximately 12 inches on center all around seal. To make a clean hold, sear edges with a small round soldering iron.  
  
NOTE: If original seal is being installed check that vent holes are open.
- (15) Install fillet plates along bottom edge of door.
- (16) Connect electrical jumper to connector on door.
- (17) Install bolts attaching swivel gland supports to door.
- (18) Connect hydraulic lines to swivel glands.
- (19) Install bolts attaching actuating links to doorjamb.
- (20) Lower door and remove sling.
- (21) Close and latch door.
- (22) Close auxiliary hydraulic pump and cargo door hydraulic control circuit breakers on EPC circuit breaker panel.

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DOOR WARNING - DESCRIPTION AND OPERATION

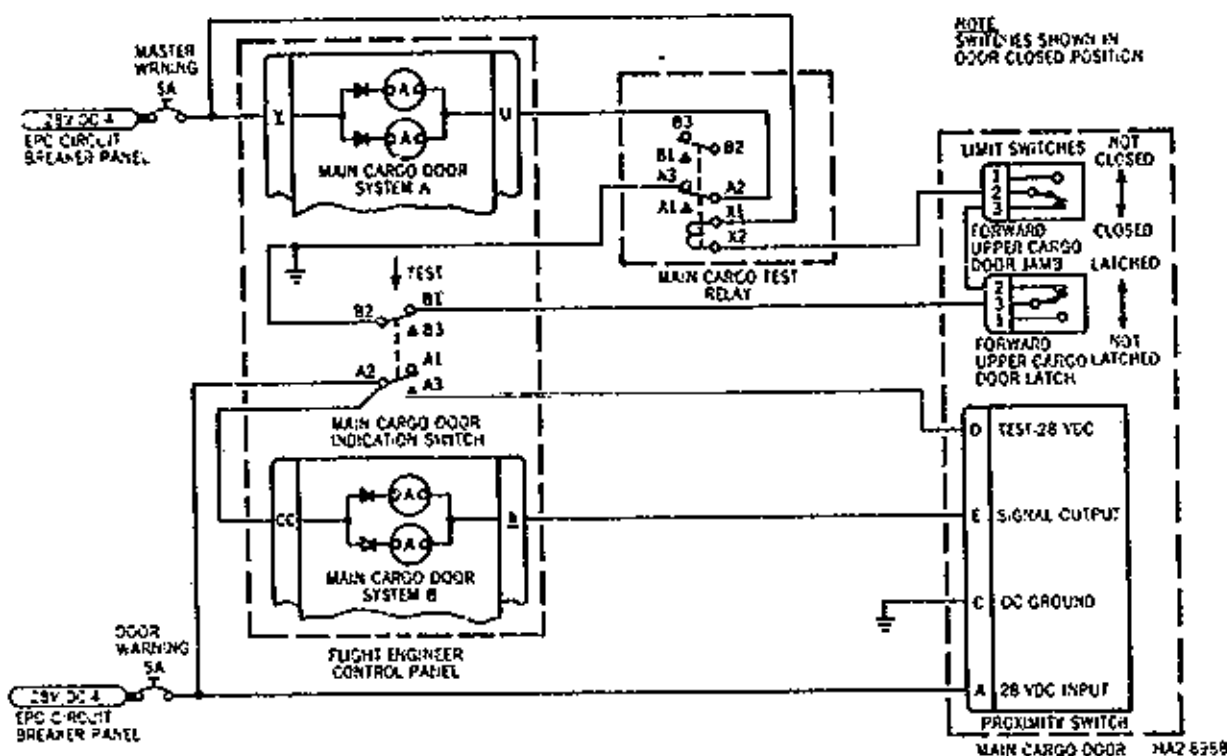
1. General

- A. The door warning system provides the flight crew with visual indication when any of the external doors of the compartments, which can be pressurized, are open.

2. Description

- A. The door warning system (see Figure 1) consists of limit switches installed in the doorjamb of the passenger, lower cargo, accessory and air conditioning compartment doors, and the doorjamb and No. 6 latch of the forward upper cargo door and a red indicating light installed on the system engineer's control panel. The indicating light, which has a press-to-test light feature, is divided into two parts and contains two lamps. One part of the indicating light is placarded cabin door open and the other part belly door open.
- (1) Airplanes N880UP and N819UP have no aft accessory compartment door.
- (2) Airplane N874UP has no left or right center service doors.
- B. The door warning system is divided into two circuits. One circuit contains the limit switches for the passenger and service doors of the passenger compartment, the forward upper cargo door, and the cabin door open part of the indicating light. The other circuit contains the limit switches for the lower cargo, accessory, and air conditioning compartment doors and the belly door open part of the indicating light.
- C. The limit switches for the passenger entrance and service doors of the passenger compartment, aft doors of the forward and aft cargo compartments, air-conditioning compartment door, and the accessory compartment door are actuated by strikers installed on the doors. With the exception of the strikers on the doors for the accessory and air-conditioning compartments the strikers are not adjustable. The limit switches for the forward doors of the forward and aft cargo compartments are actuated by the center latch-pin of the latching mechanism. All the limit switches are the override type and require no adjustment.
- D. The main cargo door warning system (see Figure 2) is divided into two circuits. System A consists of the limit switches in the doorjamb, which is actuated by the lower edge of the door, and the limit switch at the No. 6 latch, which is actuated by the lockpin for the No. 6 latch. The limit switches are the override type, and require no adjustment. System B is a proximity switch, and is activated by a lockpin attachment on the walking beam, this switch is adjustable.

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Upper Main Cargo Door Warning System - Schematic  
 Figure 2

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- E. The door warning system receives 28-vdc power through the master warning and door warning circuit breakers on the EPC circuit breaker panel.

**3. Operation**

- A. When a passenger or service door of the passenger compartment is opened, or the forward upper cargo door opened or unlatched, the limit switch for that door completes the ground circuit to the cabin door open indicating light causing the light to come on. When all the passenger and service doors of the passenger compartment are closed, and the forward upper cargo door closed and latched, the light goes off.
- B. When a door to the forward or aft lower cargo compartments, accessory, or air conditioning compartment is opened, the limit switch for that door completes the ground circuit to the belly door open indicating light causing the light to come on. When all the cargo, accessory, and air conditioning compartment doors are closed, the light goes off.
- C. When the forward upper cargo door is unlocked, the main cargo door system A and system B lights on the annunciator panel come on. If the latches are closed and locked, but the door is not fully closed, the system A light will be on and the system B light will be off. When the door is fully closed, latched, and locked, both lights will be off. A main cargo door indication switch adjacent to the annunciator panel is provided to test the switches and circuitry in system A and system B.
- D. In addition to the door warning indicating lights, the master warning light comes on when any of the compartment doors are opened, or the forward upper cargo door is opened or unlatched. When a door is opened or the forward upper cargo door is unlatched, the limit switch for that door completes a ground circuit to the master warning light on the glareshield causing the light to come on. The light remains on until all the doors are closed or the master warning light reset switch is actuated. For further information concerning the master warning light system, see Chapter 33.

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DOOR WARNING - TROUBLE SHOOTING

1. Trouble Shooting

Possible Cause	Isolation Procedure	Correction
<b>A. WITH ALL DOORS CLOSED, BOTH WARNING LIGHTS REMAIN ON.</b>		
(1) Defective indicating light assembly.	Check push-to-test operation for sticking and short circuit.	Repair or replace light assembly.
(2) Defective system wiring.	Check wiring for short or ground.	Repair or replace wiring.
(3) Defect in both cabin and door warning circuits.	Check both cabin and door warning circuits. See Paragraph B.	See Paragraph B.
<b>B. CABIN OR BELLY DOOR WARNING LIGHT REMAINS ON WITH ALL DOORS CLOSED.</b>		
(1) One or more doors not completely closed. Forward upper cargo door not locked.	Check each door to see that it is fully closed and latched.	Latch doors securely. Lock forward upper cargo door.
(2) One or more door warning switches defective.	Check each switch for continuity when operated manually.	Repair or replace switch if necessary.
(3) Bent or broken striker.	Check strikers.	Repair or replace striker.
(4) Switch actuating arm of one or more door warning switches bent or broken.	Check switch actuating arms.	Replace switch.
(5) One or more door warning switches improperly installed.	Check each switch for proper travel of switch arm when door closes.	Install switch correctly.

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DOOR WARNING SYSTEM - ADJUSTMENT/TEST

1. General

- A. Check that the door warning light and master warning light circuit breakers on the EPC circuit breaker panel are closed, and check that 28 vdc is available to the door warning and master warning systems.

2. Adjustment/Test Door Warning System

- A. Adjust upper cargo door proximity switch.

- (1) Check that at least one lockpin is bottomed in latch bracket.
- (2) Adjust lockpin flange for clearance of 0.100 inch from proximity switch.
- (3) Tighten attach bolt and safety with lockwire.

- B. Test Door Warning System

- (1) Close and latch passenger and service entrance doors of passenger compartment, forward and aft lower cargo compartment doors, air-conditioning compartment door, and accessory compartment door.

NOTE: No door is provided for the accessory compartment of airplanes N880UP and N819UP.

- (2) Close and latch forward upper cargo door.
- (3) Observe door warning and master warning lights; lights should be off.

NOTE: If master warning light is not off, actuate master warning light reset switch.

- (4) Depress door warning lights and observe lights; lights should come on.
- (5) Open passenger forward entrance door and observe door warning and master warning lights; lights should come on.
- (6) Actuate master warning light reset switch and observe master warning light; light should go off.
- (7) Close passenger forward entrance door and observe door warning light; light should go off.
- (8) Repeat steps (5) through (7) for remaining doors listed in step (1).

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(9) Test forward upper cargo door warning light circuit as follows:

- (a) Unlock forward upper cargo door. Main cargo door system A and system B lights should come on.
- (b) Open forward upper cargo door until clear of lower doorjamb. Both lights should remain on.
- (c) Manually actuate switch at aft end of lockpin walking beam, and hold. Both lights should remain on.
- (d) Manually actuate switch on lower edge of door, and hold. System A light should go off, and system B light should remain on.
- (e) Release both switches. Both lights should be on.
- (f) Close and lock door. Both lights should go off.

**CHAPTER**

**54**

**NACELLES /  
PYLONS**



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CHAPTER 54

NACELLES / PYLONS

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HIGHLIGHTS

TO: ALL HOLDERS OF DC-8 SEVENTY SERIES MAINTENANCE MANUAL

CONCERNING: REVISION 19, CHAPTER 54, DATED: APR 1/88

54-CONT REVISED TO ADD NEW GENERIC TABLE OF CONTENTS.

54-IDENT REVISED TO ADD NEW GENERIC AIRPLANE IDENTIFICATION LIST.

MANUAL UPDATE INSTRUCTIONS

PLEASE INSERT REVISED AND NEW PAGES INTO THIS MANUAL IN ACCORDANCE WITH THE CURRENT LIST OF EFFECTIVE PAGES. ALL EXISTING PAGES IN YOUR MANUAL THAT ARE BEING REPLACED WITH REVISED PAGES ARE TO BE REMOVED FROM YOUR MANUAL.

AN (\*) ASTERISK IN FRONT OF AN ENTRY ON THE LIST OF EFFECTIVE PAGES INDICATES NEW OR REVISED PAGES.

A LIST OF PAGES DELETED BY THE CURRENT REVISION IS BEING FURNISHED AS A PART OF THE HIGHLIGHTS AND DELETED PAGES SHOULD BE REMOVED FROM YOUR MANUAL.

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54-CONT		1	APR 1/88				
54-IDENT		1	APR 1/88				
54-IDENT		2	APR 1/88				
54-IDENT		3	APR 1/88				
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54-20-1	50	202	DEC 1/82				
54-20-1	50	202A	DEC 1/82				
54-20-1	50	203	DEC 1/82				
54-20-1	50	204	NOV 1/81				
54-20-2	50	201	DEC 1/82				
54-20-2	50	202	JUN 1/83				
54-20-2	50	202A	DEC 1/82				
54-20-2	50	203	DEC 1/82				
54-20-2	50	204	NOV 1/81				
54-20-3	50	201	NOV 1/81				
54-20-3	50	202	NOV 1/81				
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54-20-6	50	202A	DEC 1/82				
54-20-6	50	203	NOV 1/81				
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54-20-7	50	202	DEC 1/82				
54-20-7	50	203	DEC 1/82				
54-20-7	50	204	DEC 1/82				

\*The asterisk indicates pages revised or added by the current revision.

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Chapter 54

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AIRPLANE IDENTIFICATION

Manufacturing Series	Factory Serial Numbers	Fuselage Numbers
DC8-71	45810	252
DC8-71	45811	262
DC8-71	45812	277
DC8-71	45813	284
DC8-71	45849	289
DC8-71	45891	305
DC8-71CF	45897	313
DC8-71CF	45898	320
DC8-71CF	45900	316
DC8-71CF	45902	294
DC8-71	45907	288
DC8-71	45913	325
DC8-71	45914	292
DC8-71	45915	295
DC8-73CF	45936	344
DC8-71CF	45938	331
DC8-71CF	45939	351
DC8-71	45941	317
DC8-71	45944	326
DC8-71	45945	337
DC8-71	45946	339
DC8-71	45947	341
DC8-71CF	45948	321
DC8-71CF	45949	329
DC8-71CF	45950	354
DC8-71CF	45952	338
DC8-71	45963	355
DC8-73CF	45966	393
DC8-73CF	45967	385
DC8-73CF	45968	389
DC8-71	45970	343
DC8-71	45971	356
DC8-71	45973	358
DC8-71	45974	368
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DC8-71	45976	372
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AIRPLANE IDENTIFICATION

Manufacturing Series	Factory Serial Number	Fuselage Number
DC8-71	45983	350
DC8-73CF	45990	375
DC8-73CF	45991	380
DC8-71	45993	382
DC8-71	45994	387
DC8-71	45995	388
DC8-71	45996	397
DC8-71	45997	398
DC8-71	45998	399
DC8-73CF	46001	395
DC8-73CF	46002	394
DC8-73AF	46003	401
DC8-73AF	46004	403
DC8-73AF	46006	413
DC8-73AF	46007	422
DC8-73AF	46008	423
DC8-72CF	46013	427
DC8-71	46014	400
DC8-71	46018	420
DC8-73AF	46019	411
DC8-71	46029	425
DC8-71	46030	426
DC8-73	46033	431
DC8-71	46039	448
DC8-71	46040	449
DC8-72CF	46043	443
DC8-73AF	46044	432
DC8-73CF	46045	441
DC8-73CF	46046	444
DC8-73CF	46047	447
DC8-71	46048	450
DC8-73CF	46049	479
DC8-73CF	46051	440
DC8-73CF	46052	442
DC8-73	46053	446
DC8-71	46055	492
DC8-71	46056	495
DC8-73CF	46059	456
DC8-73CF	46062	486
DC8-73	46063	457

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AIRPLANE IDENTIFICATION

Manufacturing Series	Factory Serial Number	Fuselage Number
DC8-71	46064	459
DC8-71	46065	460
DC8-71	46066	462
DC8-72	46067	455
DC8-71	46072	477
DC8-73CF	46073	485
DC8-73AF	46074	468
DC8-73	46076	451
DC8-73AF	46080	466
DC8-72	46081	471
DC8-72	46082	458
DC8-72	46084	473
DC8-73CF	46086	478
DC8-73CF	46087	454
DC8-73CF	46089	501
DC8-73CF	46090	504
DC8-73CF	46091	519
DC8-73CF	46094	482
DC8-73	46095	497
DC8-71	46099	507
DC8-73	46100	502
DC8-73CF	46101	489
DC8-73CF	46103	483
DC8-73CF	46104	488
DC8-73CF	46106	490
DC8-73CF	46108	522
DC8-73CF	46109	493
DC8-73CF	46112	520
DC8-73CF	46117	525
DC8-73	46123	508
DC8-73	46124	511
DC8-73	46125	515
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DC8-73CF	46133	534
DC8-73CF	46135	531
DC8-73CF	46140	528
DC8-73CF	46149	538

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PYLON LEADING EDGE - MAINTENANCE PRACTICES

1. General

- A. Removal and installation procedures for the leading edge sections are identical for all sections, which differ only in size and shape.
- B. The leading edge consists of the 11 removable sections forward of pylon station YN 270.500.
- R C. All leading edge sections are attached with screws, except section  
R 193A/293A, which has a hinged access door with two quick fasteners that also  
R serve as section fasteners.

2. Tools and Equipment Required

NOTE: Equivalent substitutes may be used instead of following listed items:

Item	Name	Number	Manufacturer	Use
A	Coating, Anti-Chafe (3-part kit)	Gray, Color DN3635, Base: 3-1X-7, Catalyst: 3-1H-3, Thinner: 3D-C-1 or White, Color DN7622, Base: 3-1H-3, Catalyst: 3-1H-3, Thinner: 3D-C-1	Advanced Coatings & Chemical Co., S. El Monte, CA	To prevent skin edges from chafing.



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3. Removal/Installation Pylon Leading Edge

A. Remove Leading Edge.

- (1) Tag throttle/thrust reverser lever, and open and tag following circuit breakers:

NOTE: Numbering on circuit breaker panel denotes engine position.

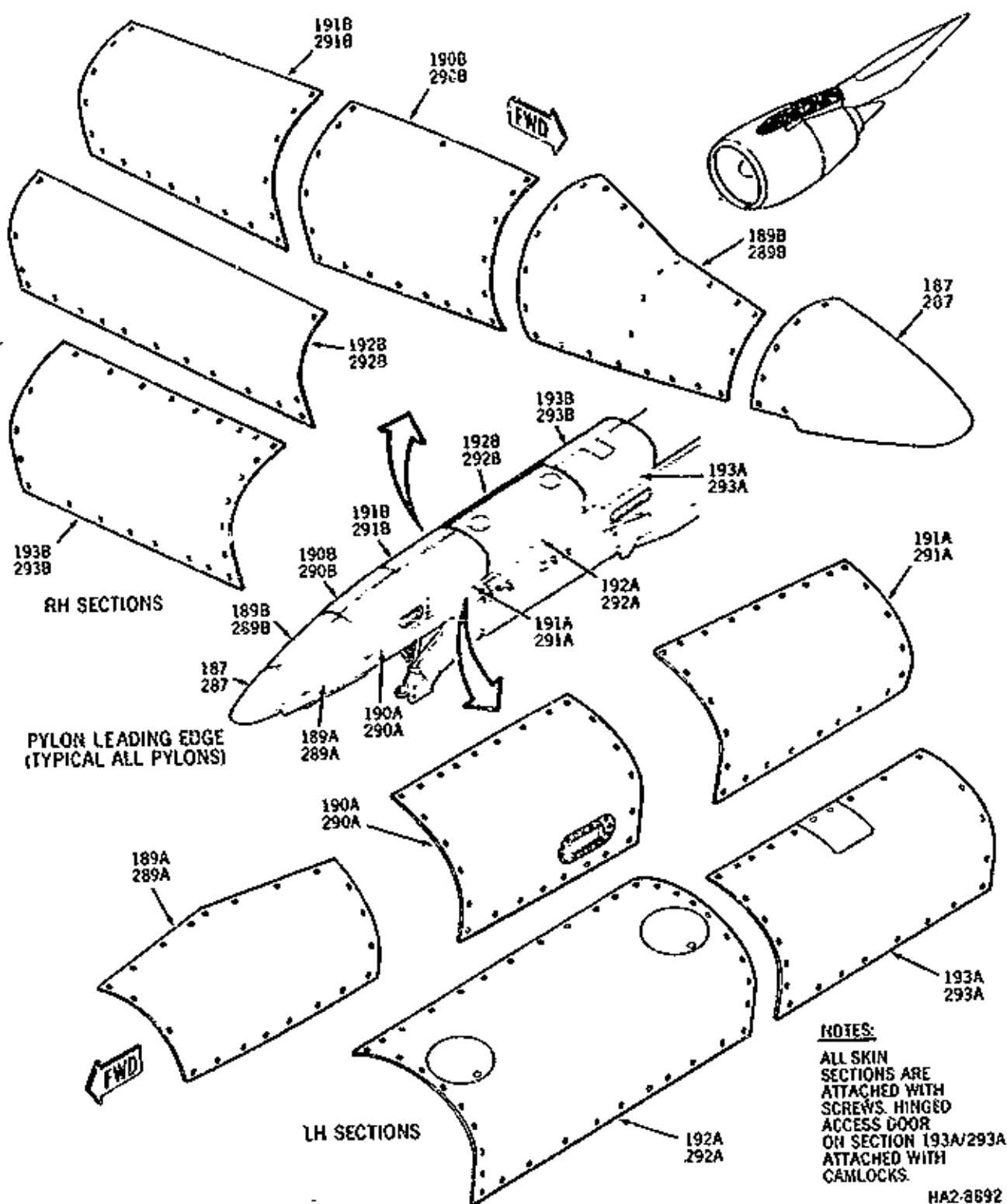
Circuit Breaker	Section
Engine ignition	Ac bus 1, 2, 3, or 4
Engine starters	Battery bus
Ignition P.S. control (Engines 2 and 3)	Battery bus
Ignition & tach pwr supply (Engines 2 and 3)	Battery bus
Thrust reverser emer stow	Ac bus 3
Reverse thrust	Dc bus 1 or 4

- (2) Close thrust reverser hydraulic system manual shutoff normal and emergency stow valves, located in left main gear wheel well.

R (3) Remove attaching hardware. For section 193A/293A, disconnect two Camloc  
 R fasteners.

R (4) Remove leading edge section.

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Pylon Leading Edge - Maintenance Practices  
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**B. Install Leading Edge.**

- (1) Make certain that throttle/thrust reverser lever is tagged, and following circuit breakers are open and tagged:

NOTE: Numbering on circuit breaker panel denotes engine position.

Circuit Breaker	Section
Engine ignition	Ac bus 1, 2, 3, or 4
Engine starters	Battery bus
Ignition P.S. control (Engines 2 and 3)	Battery bus
Ignition & tech pwr supply (Engines 2 and 3)	Battery bus
Thrust reverser emer stow	Ac bus 3
Reverse thrust	Dc bus 1 or 4

- (2) Make certain thrust reverser hydraulic system manual shutoff normal and emergency stow valves, located in left main gear wheel well are closed.

R (3) Coat faying surfaces at edges of skin (along screw line) with anti-chafe coating.

R (4) Position leading edge section.

R (5) Install attaching hardware. For section 193A/293A, connect two Camloc fasteners.  
 R

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- (6) Remove tag from throttle/thrust reverser lever, and remove tags and close following circuit breakers:

NOTE: Numbering on circuit breaker panel denotes engine position.

Circuit Breaker	Section
Engine ignition	Ac bus 1, 2, 3, or 4
Engine starters	Battery bus
Ignition P.S. control (Engines 2 and 3)	Battery bus
Ignition & tach pwr supply (Engines 2 and 3)	Battery bus
Thrust reverser emer stow	Ac bus 3
Reverse thrust	Dc bus 1 or 4

- (7) Open thrust reverser hydraulic system manual shutoff normal and emergency stow valves, located in left main gear wheel well. Safety valves in open position with lockwire.

WARNING: MAKE CERTAIN FLIGHT COMPARTMENT THRUST REVERSER LEVER POSITION CORRESPONDS WITH THRUST REVERSER TRANSLATING COM. POSITION AND THAT ALL PERSONNEL AND EQUIPMENT ARE WELL CLEAR OF THRUST REVERSERS ON ALL FOUR ENGINES BEFORE OPENING MANUAL SHUTOFF VALVES. INADVERTENT THRUST REVERSER OPERATION COULD RESULT IN DEATH OR SERIOUS INJURY TO PERSONNEL.

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PYLON LEADING EDGE FAIRING - MAINTENANCE PRACTICES

1. General

- A. Removal and installation procedures for the leading edge fairing is identical for both inboard and outboard pylons, which differ only in size and shape.

R B. The leading edge fairing consists of three sections on the inboard pylon.

2. Tools and Equipment Required

NOTE: Equivalent substitutes may be used instead of following listed items:

Item	Name	Number	Manufacturer	Use
A	Coating, Anti-Chafe (3-part kit)	Gray, Color DN3635, Base: 3-1X-7, Catalyst: 3-1H-3, Thinner: 30-C-1 or White, Color DN7622, Base: 3-1H-3, Catalyst: 3-1H-3, Thinner: 30-C-1	Advanced Coatings & Chemical Co., S. El Monte, CA	To prevent skin edges from chafing.

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**3. Removal/Installation Pylon Leading Edge Fairing**

**A. Remove Fairing.**

- (1) Tag throttle/thrust reverser lever, and open and tag following circuit breakers:

**NOTE:** Numbering on circuit breaker panel denotes engine position.

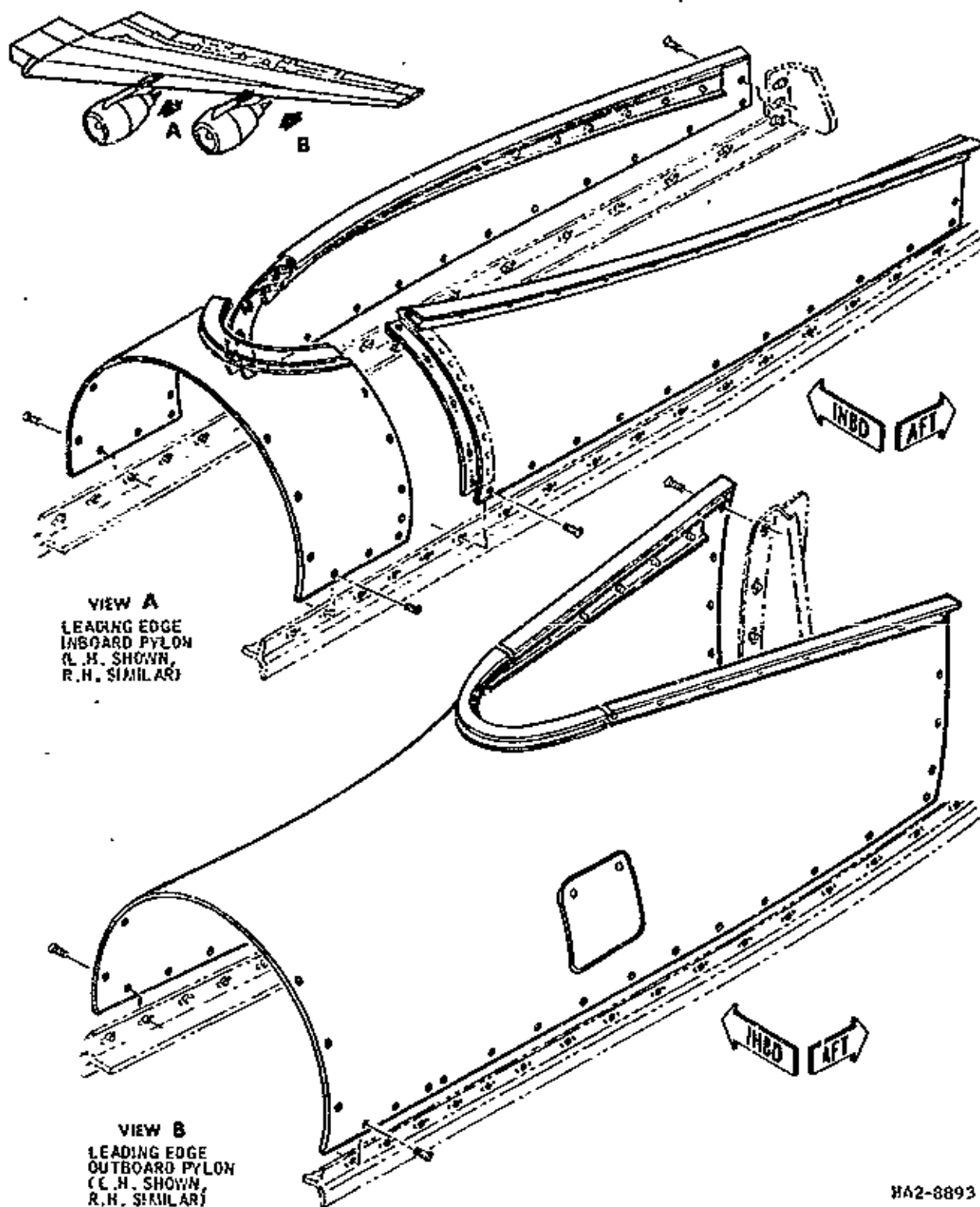
Circuit Breaker	Section
Engine ignition	Ac bus 1, 2, 3, or 4
Engine starters	Battery bus
Ignition P.S. control (Engines 2 and 3)	Battery bus
Ignition & tach pwr supply (Engines 2 and 3)	Battery bus
Thrust reverser emer stow	Ac bus 3
Reverse thrust	Dc bus 1 or 4

- (2) Close thrust reverser hydraulic system manual shutoff normal and emergency stow valves, located in left main gear wheel well.
- (3) Remove attaching hardware.
- (4) Remove fairing.

**NOTE:** Any of the three sections of the fairing on the inboard pylon may be removed separately.

**NOTE:** Aft end of outboard fairing may be spread slightly to clear pylon while removing fairing.

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Pylon Leading Edge Fairing - Maintenance Practices  
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8. Install Fairing.

- (1) Make certain that throttle/thrust reverser lever is tagged, and following circuit breakers are open and tagged:

NOTE: Numbering on circuit breaker panel denotes engine position.

Circuit Breaker	Section
Engine ignition	Ac bus 1, 2, 3, or 4
Engine starters	Battery bus
Ignition P.S. control (Engines 2 and 3)	Battery bus
Ignition & tach pwr supply (Engines 2 and 3)	Battery bus
Thrust reverser emer stow	Ac bus 3
Reverse thrust	Dc bus 1 or 4

- (2) Make certain thrust reverser hydraulic system manual shutoff normal and emergency stow valves, located in left main gear wheel well are closed.

R (3) Coat faying surfaces at edges of skin (along screw line) with anti-chafe coating.

R (4) Position fairing.

R NOTE: The three sections of the inboard fairing are installed separately.

R NOTE: Aft end of outboard fairing may be spread slightly to clear pylon while installing fairing.

R (5) Install attaching hardware.



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- (6) Remove tag from throttle/thrust reverser lever, and remove tags and close following circuit breakers:

NOTE: Numbering on circuit breaker panel denotes engine position.

Circuit Breaker	Section
Engine ignition	Ac bus 1, 2, 3, or 4
Engine starters	Battery bus
Ignition P.S. control (Engines 2 and 3)	Battery bus
Ignition & tach pwr supply (Engines 2 and 3)	Battery bus
Thrust reverser emer stop	Ac bus 3
Reverse thrust	Dc bus 1 or 4

- (7) Open thrust reverser hydraulic system manual shutoff normal and emergency stop valves, located in left main gear wheel well. Safety valves in open position with lockwire.

WARNING: MAKE CERTAIN FLIGHT COMPARTMENT THRUST REVERSER LEVER POSITION CORRESPONDS WITH THRUST REVERSER TRANSLATING COM. POSITION AND THAT ALL PERSONNEL AND EQUIPMENT ARE WELL CLEAR OF THRUST REVERSERS ON ALL FOUR ENGINES BEFORE OPENING MANUAL SHUTOFF VALVES. INADVERTENT THRUST REVERSER OPERATION COULD RESULT IN DEATH OR SERIOUS INJURY TO PERSONNEL.

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B. Install fairing

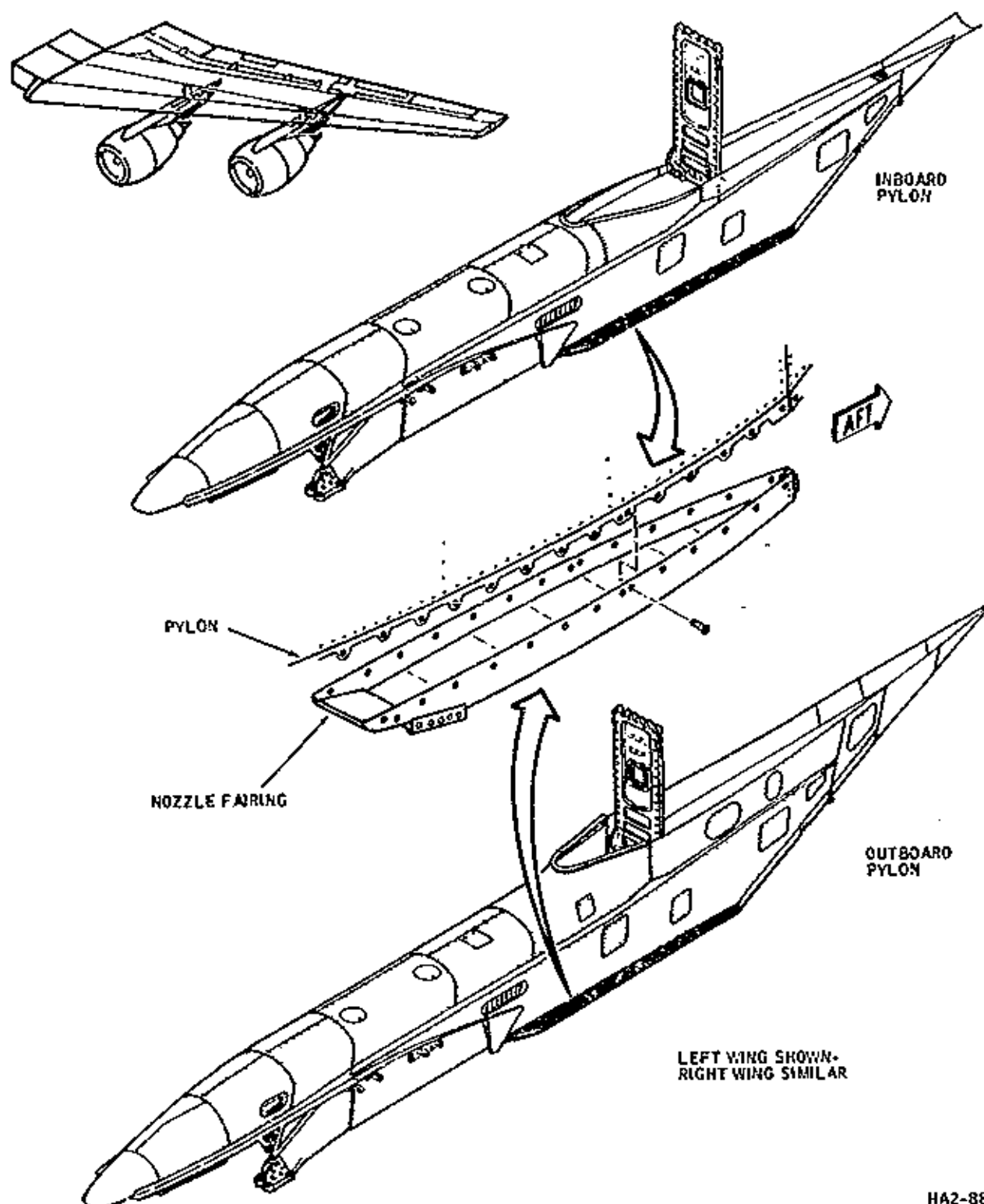
- (1) Make certain that throttle/thrust reverser lever is tagged, and following circuit breakers are open and tagged:

NOTE: Numbering on circuit breaker panel denotes engine position.

Circuit Breaker	Section
Engines ignition	Ac bus 1, 2, 3, or 4
Engine starters	Battery bus
Ignition P.S. control (Engines 2 and 3)	Battery bus
Ignition & tach pwr supply (Engines 2 and 3)	Battery bus
Thrust reverser over stow	Ac bus 3
Reverse thrust	Dc bus 1 or 4

- (2) Make certain thrust reverser hydraulic system manual shutoff normal and emergency stow valves, located in left main gear wheel well are closed.
- (3) Position nozzle fairing.
- (4) Install attaching hardware.

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HA2-8894

Pylon Nozzle fairing - Maintenance Practices  
Figure 201

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- (5) Remove tag from throttle/thrust reverser lever, and remove tags and close following circuit breakers:

NOTE: Numbering on circuit breaker panel denotes engine position.

Circuit Breaker	Section
Engine ignition	Ac bus 1, 2, 3, or 4
Engine starters	Battery bus
Ignition P.S. control (Engines 2 and 3)	Battery bus
Ignition & tach pwr supply (Engines 2 and 3)	Battery bus
Thrust reverser emer stow	Ac bus 3
Reverse thrust	Dc bus 1 or 4

- (6) Open thrust reverser hydraulic system manual shutoff normal and emergency stow valves, located in left main gear wheel well. Safety valves in open position with lockwire.

WARNING: MAKE CERTAIN FLIGHT COMPARTMENT THRUST REVERSER LEVER POSITION CORRESPONDS WITH THRUST REVERSER TRANSLATING COWL POSITION AND THAT ALL PERSONNEL AND EQUIPMENT ARE WELL CLEAR OF THRUST REVERSERS ON ALL FOUR ENGINES BEFORE OPENING MANUAL SHUTOFF VALVES. INADVERTENT THRUST REVERSER OPERATION COULD RESULT IN DEATH OR SERIOUS INJURY TO PERSONNEL.

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PYLON AFT KEEL FAIRING - MAINTENANCE PRACTICES

1. General

- A. Removal and installation procedures for the aft keel fairing are identical for both inboard and outboard pylons.

2. Removal/Installation Pylon Aft Keel Fairing

A. Remove Fairing.

- (1) Tag throttle/thrust reverser lever, and open and tag following circuit breakers:

NOTE: Numbering on circuit breaker panel denotes engine position.

Circuit Breaker	Section
Engine ignition	Ac bus 1, 2, 3, or 4
Engine starters	Battery bus
Ignition P.S. control (Engines 2 and 3)	Battery bus
Ignition & tach pwr supply (Engines 2 and 3)	Battery bus
Thrust reverser emer stow	Ac bus 3
Reverse thrust	Dc bus 1 or 4

- (2) Close thrust reverser hydraulic system manual shutoff normal and emergency stow valves, located in left main gear wheel well.
- (3) Remove attaching hardware.
- (4) Remove aft keel fairing.

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**B. Install Fairing**

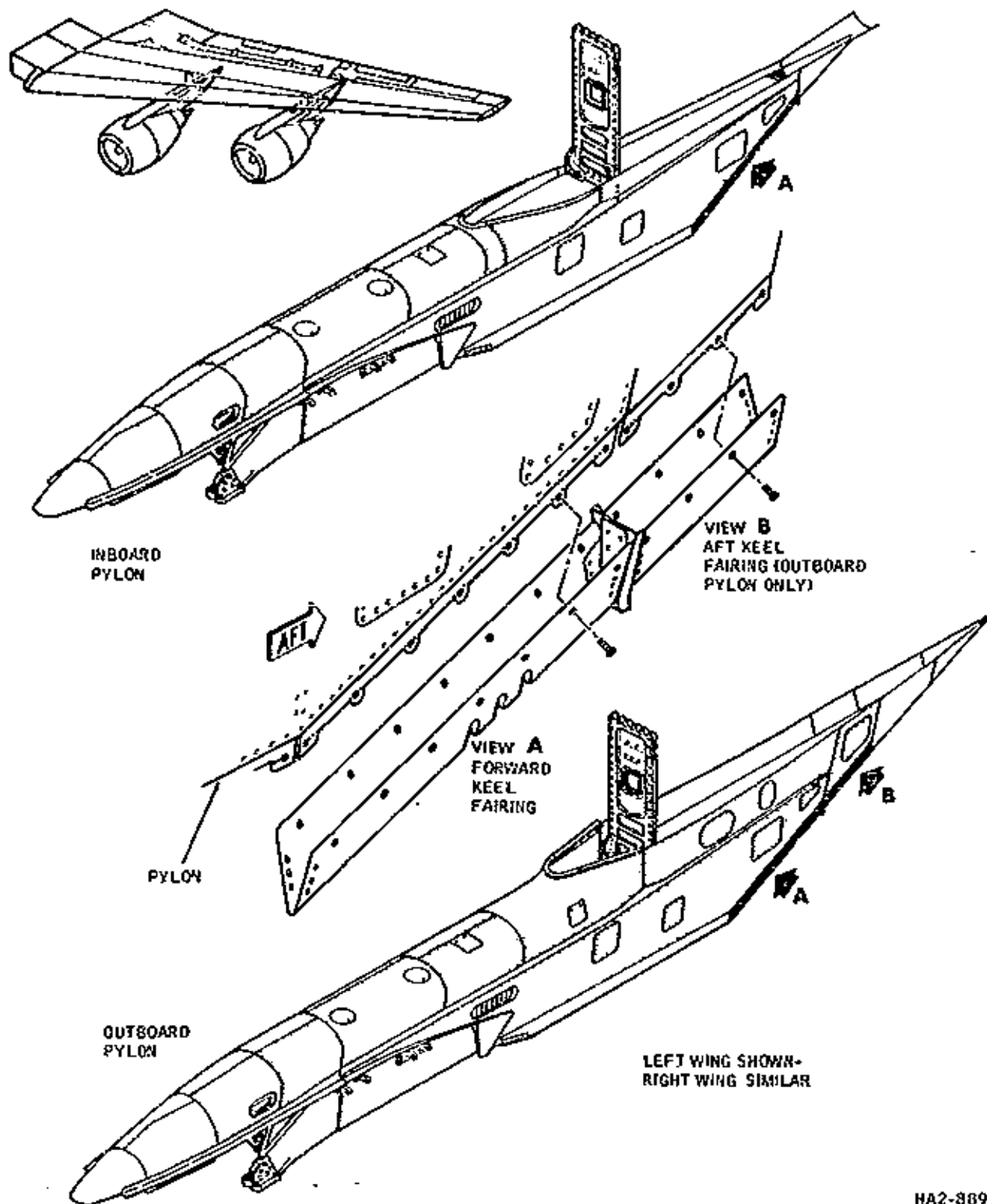
- (1) Make certain that throttle/thrust reverser lever is tagged, and following circuit breakers are open and tagged:

NOTE: Numbering on circuit breaker panel denotes engine position.

Circuit Breaker	Section
Engine ignition	Ac bus 1, 2, 3, or 4
Engine starters	Battery bus
Ignition P.S. control (Engines 2 and 3)	Battery bus
Ignition & tach pwr supply (Engines 2 and 3)	Battery bus
Thrust reverser emer stow	Ac bus 3
Reverse thrust	Dc bus 1 or 4

- (2) Make certain thrust reverser hydraulic system manual shutoff normal and emergency stow valves, located in left main gear wheel well are closed.
- (3) Position aft keel fairing.
- (4) Install attaching hardware.

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Pylon Aft Keel Fairing - Maintenance Practices  
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- (5) Remove tag from throttle/thrust reverser lever, and remove tags and close following circuit breakers:

NOTE: Numbering on circuit breaker panel denotes engine position.

Circuit Breaker	Section
Engine ignition	Ac bus 1, 2, 3, or 4
Engine starters	Battery bus
Ignition P.S. control (Engines 2 and 3)	Battery bus
Ignition & tach pwr supply (Engines 2 and 3)	Battery bus
Thrust reverser emer stow	Ac bus 3
Reverse thrust	Dc bus 1 or 4

- (6) Open thrust reverser hydraulic system manual shutoff normal and emergency stow valves, located in left main gear wheel well. Safety valves in open position with lockwire.

WARNING: MAKE CERTAIN FLIGHT COMPARTMENT THRUST REVERSER LEVER POSITION CORRESPONDS WITH THRUST REVERSER TRANSLATING COWL POSITION AND THAT ALL PERSONNEL AND EQUIPMENT ARE WELL CLEAR OF THRUST REVERSERS ON ALL FOUR ENGINES BEFORE OPENING MANUAL SHUTOFF VALVES. INADVERTENT THRUST REVERSER OPERATION COULD RESULT IN DEATH OR SERIOUS INJURY TO PERSONNEL.



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PYLON TRAILING EDGE - MAINTENANCE PRACTICES

1. General

- A. Removal and installation procedures for the trailing edge are identical for both inboard and outboard pylons, except as noted in paragraph 8.
- B. The trailing edge for the outboard pylon is in two sections which may be removed as a unit or singly.

2. Removal/Installation Pylon Trailing Edge

A. Remove Edge.

- (1) Tag throttle/thrust reverser lever, and open and tag following circuit breakers:

NOTE: Numbering on circuit breaker panel denotes engine position.

Circuit Breaker	Section
Engine ignition	Ac bus 1, 2, 3, or 4
Engine starters	Battery bus
Ignition P.S. control (Engines 2 and 3)	Battery bus
Ignition & tach pwr supply (Engines 2 and 3)	Battery bus
Thrust reverser emer stow	Ac bus 3
Reverse thrust	Dc bus 1 or 4

- (2) Close thrust reverser hydraulic system manual shutoff normal and emergency stow valves, located in left main gear wheel well.
- (3) Remove attaching hardware.
- (4) Remove trailing edge.

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B. Install Edge.

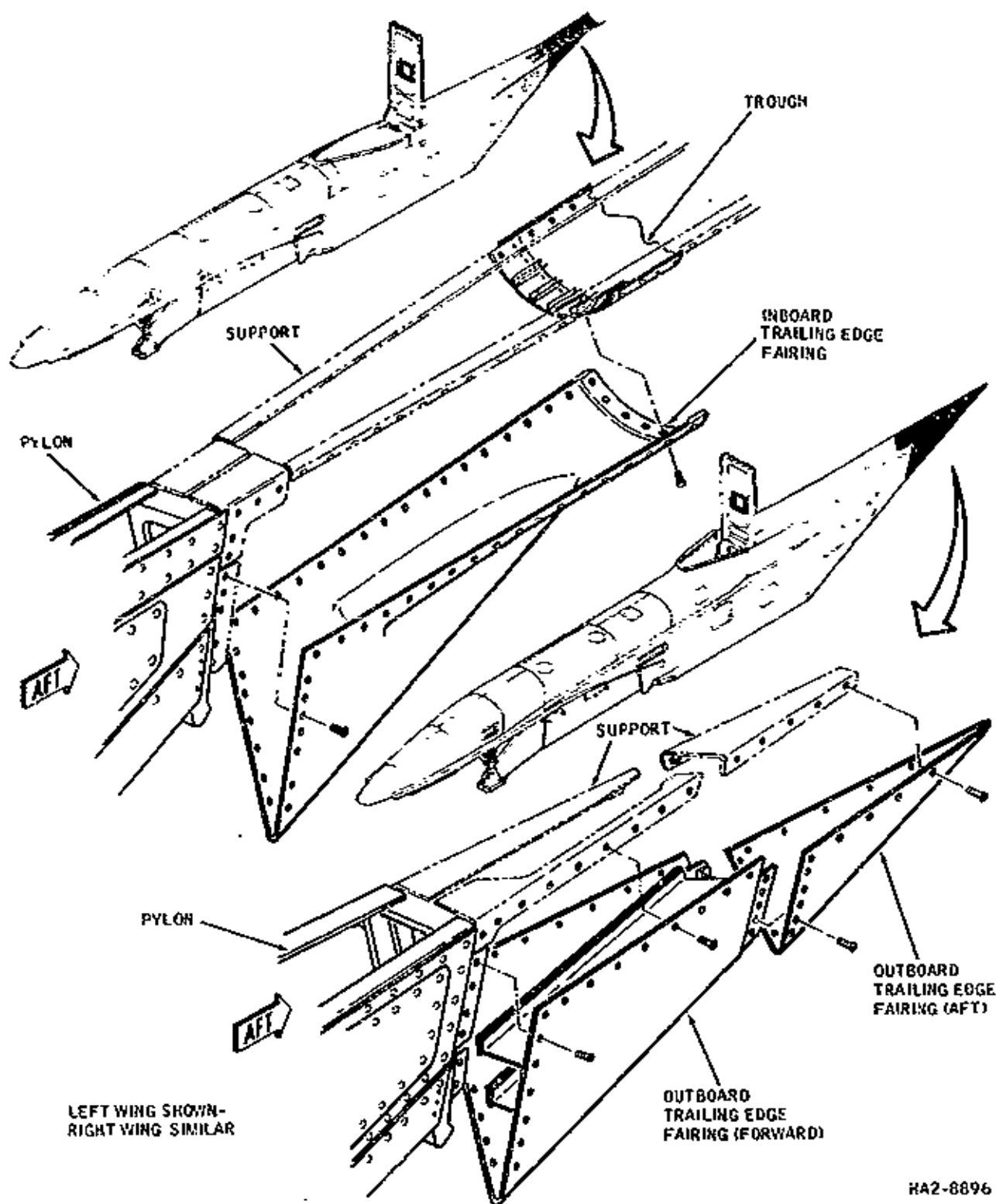
- (1) Make certain that throttle/thrust reverser lever is tagged, and following circuit breakers are open and tagged:

NOTE: Numbering on circuit breaker panel denotes engine position.

Circuit Breaker	Section
Engine ignition	Ac bus 1, 2, 3, or 4
Engine starters	Battery bus
Ignition P.S. control (Engines 2 and 3)	Battery bus
Ignition & tach pwr supply (Engines 2 and 3)	Battery bus
Thrust reverser emer stop	Ac bus 3
Reverse thrust	Dc bus 1 or 4

- (2) Make certain thrust reverser hydraulic system manual shutoff normal and emergency stop valves, located in left main gear wheel well are closed.
- (3) Position trailing edge.
- (4) Install attaching hardware.

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Pylon Trailing Edge - Maintenance Practices  
 Figure 201

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- (5) Remove tag from throttle/thrust reverser lever, and remove tags and close following circuit breakers:

NOTE: Numbering on circuit breaker panel denotes engine position.

Circuit Breaker	Section
Engine ignition	Ac bus 1, 2, 3, or 4
Engine starters	Battery bus
Ignition P.S. control (Engines 2 and 3)	Battery bus
Ignition & tach pwr supply (Engines 2 and 3)	Battery bus
Thrust reverser emer stow	Ac bus 3
Reverse thrust	Dc bus 1 or 4

- (6) Open thrust reverser hydraulic system manual shutoff normal and emergency stow valves, located in left main gear wheel well. Safety valves in open position with lockwire.

WARNING: MAKE CERTAIN FLIGHT COMPARTMENT THRUST REVERSER LEVER POSITION CORRESPONDS WITH THRUST REVERSER TRANSLATING COWL POSITION AND THAT ALL PERSONNEL AND EQUIPMENT ARE WELL CLEAR OF THRUST REVERSERS ON ALL FOUR ENGINES BEFORE OPENING MANUAL SHUTOFF VALVES. INADVERTENT THRUST REVERSER OPERATION COULD RESULT IN DEATH OR SERIOUS INJURY TO PERSONNEL.

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PYLON FILLER - MAINTENANCE PRACTICES

1. General

- A. Removal and installation procedures for the filler are identical for both inboard and outboard pylons, which differ only in size.
- B. The filler on the inboard side of each pylon is smaller than the filler on the outboard side.

2. Removal/Installation Pylon Filler

A. Remove Filler.

- (1) Tag throttle/thrust reverser lever, and open and tag following circuit breakers:

NOTE: Numbering on circuit breaker panel denotes engine position.

Circuit Breaker	Section
Engine ignition	Ac bus 1, 2, 3, or 4
Engine starters	Battery bus
Ignition P.S. control (Engines 2 and 3)	Battery bus
Ignition & tach pwr supply (Engines 2 and 3)	Battery bus
Thrust reverser emer stow	Ac bus 3
Reverse thrust	Dc bus 1 or 4

- (2) Close thrust reverser hydraulic system manual shutoff normal and emergency stow valves, located in left main gear wheel well.
- (3) Remove attaching hardware.
- (4) Remove filler.

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**B. Install Filler.**

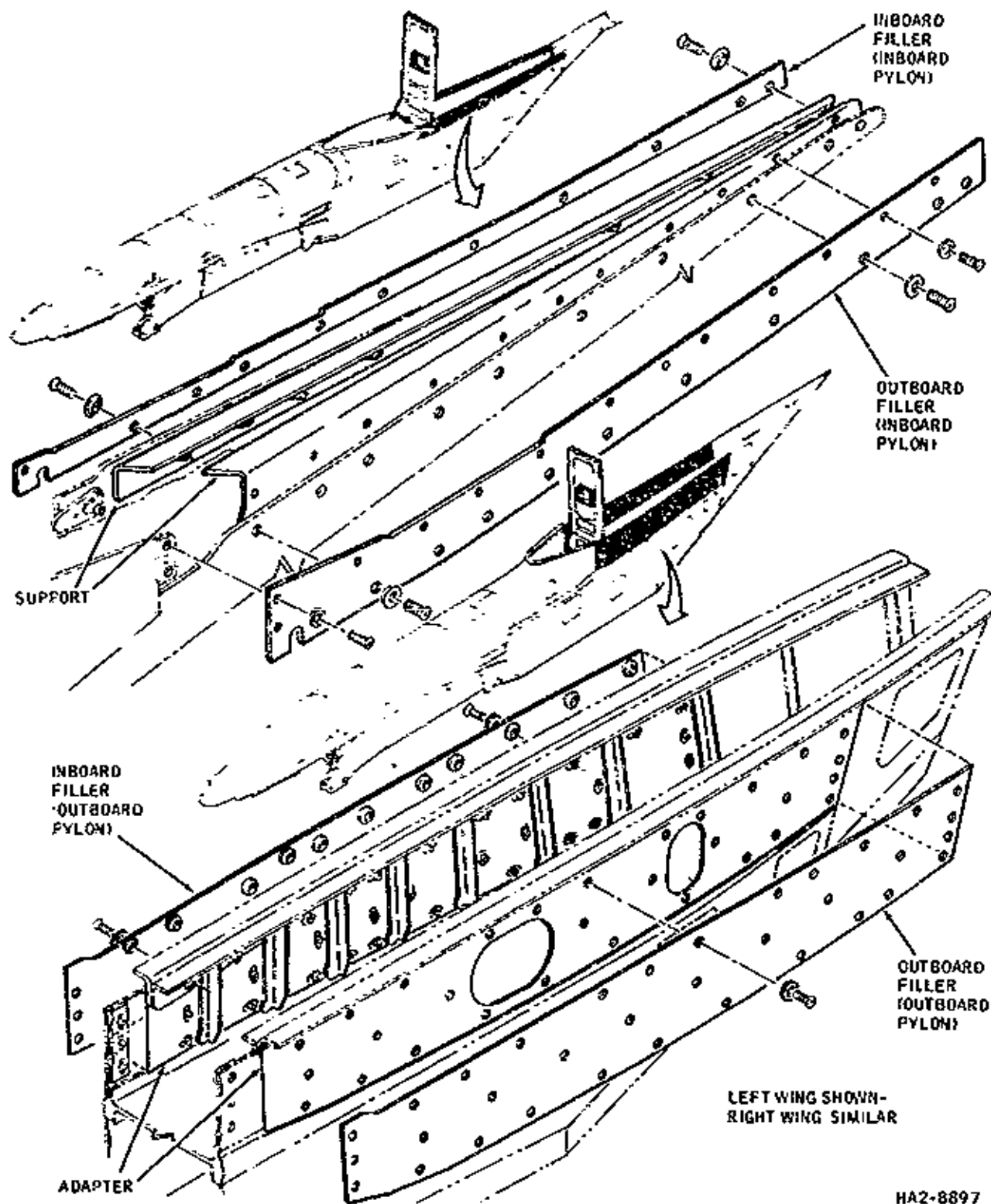
- (1) Make certain that throttle/thrust reverser lever is tagged, and following circuit breakers are open and tagged:

NOTE: Numbering on circuit breaker panel denotes engine position.

Circuit Breaker	Section
Engine ignition	Ac bus 1, 2, 3, or 4
Engine starters	Battery bus
Ignition P.S. control (Engines 2 and 3)	Battery bus
Ignition & tach pwr supply (Engines 2 and 3)	Battery bus
Thrust reverser emer stow	Ac bus 3
Reverse thrust	Dc bus 1 or 4

- (2) Make certain thrust reverser hydraulic system manual shutoff normal and emergency stow valves, located in left main gear wheel well are closed.
- (3) Position filler.
- (4) Install attaching hardware.

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Pylon Filler - Maintenance Practices  
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- (5) Remove tag from throttle/thrust reverser lever, and remove tags and close following circuit breakers:

NOTE: Numbering on circuit breaker panel denotes engine position.

Circuit Breaker	Section
Engine ignition	Ac bus 1, 2, 3, or 4
Engine starters	Battery bus
Ignition P.S. control (Engines 2 and 3)	Battery bus
Ignition & tach pwr supply (Engines 2 and 3)	Battery bus
Thrust reverser emer stow	Ac bus 3
Reverse thrust	Dc bus 1 or 4

- (6) Open thrust reverser hydraulic system manual shutoff normal and emergency stow valves, located in left main gear wheel well. Safety valves in open position with lockwire.

WARNING: MAKE CERTAIN FLIGHT COMPARTMENT THRUST REVERSER LEVER POSITION CORRESPONDS WITH THRUST REVERSER TRANSLATING COWL POSITION AND THAT ALL PERSONNEL AND EQUIPMENT ARE WELL CLEAR OF THRUST REVERSERS ON ALL FOUR ENGINES BEFORE OPENING MANUAL SHUTOFF VALVES. INADVERTENT THRUST REVERSER OPERATION COULD RESULT IN DEATH OR SERIOUS INJURY TO PERSONNEL.



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PYLON TROUGH - MAINTENANCE PRACTICES

1. General

- A. Removal and installation procedures for the pylon trough are applicable to the inboard pylon only.

2. Removal/Installation Pylon Trough

- A. Remove Trough.

- (1) Tag throttle/thrust reverser lever, and open and tag following circuit breakers:

NOTE: Numbering on circuit breaker panel denotes engine position.

Circuit Breaker	Section
Engine ignition	Ac bus 1, 2, 3, or 4
Engine starters	Battery bus
Ignition P.S. control (Engines 2 and 3)	Battery bus
Ignition & tach pwr supply (Engines 2 and 3)	Battery bus
Thrust reverser emer stow	Ac bus 3
Reverse thrust	Dc bus 1 or 4

- (2) Close thrust reverser hydraulic system manual shutoff normal and emergency stow valves, located in left main gear wheel well.

- (3) Remove attaching hardware.

- (4) Remove trough.

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Item	Name	Number	Manufacturer	Use
C	Sling, leading edge double section	5710114	Aircraft Mechanics, Inc.,	Removing installing, and general handling of all leading edge double sections
D	Hydraulic jack	3933	Regent Jack Co., Downey, Calif.	Support and stabilize wing, when removing leading edge
		or		
		39001001	Sancor Products, Hawthorne, Calif.	

### 3. Removal/Installation Wing Inboard Leading Edge Sections

#### A. Remove Wing Inboard Leading Edge Sections as a Unit

**NOTE:** It might be necessary when removing or installing leading edge sections to remove the droop from the wing by jacking at the wing auxiliary support.

- (1) Remove plug screws from lower wing panel outboard of outboard pylon.

**NOTE:** Stow plug screws in wing auxiliary support fitting to prevent loss of screws.

- (2) Install wing auxiliary support fitting on wing with attaching bolts supplied with adapter (see Figure 201).
- (3) Position hydraulic jack directly beneath wing auxiliary support fitting.

**CAUTION:** JACK MUST BE DESIGNED TO RELIEVE AT 13,500 POUNDS (6129 KG), TO PREVENT DAMAGE TO WING STRUCTURE.

- (4) Extend jack screw extension until extension is snug against fitting.

**WARNING:** WHEN USING JACK SCREW EXTENSION, MAKE CERTAIN EXTENSION IS NOT EXTENDED BEYOND SAFE THREAD ENGAGEMENT (THREE TO FOUR THREADS MINIMUM) TO PREVENT JACK FROM COLLAPSING, RESULTING IN INJURY TO PERSONNEL AND DAMAGE TO AIRPLANE.

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- (5) Remove tag from throttle/thrust reverser lever, and remove tags and close following circuit breakers:

NOTE: Numbering on circuit breaker panel denotes engine position.

Circuit Breaker	Section
Engine ignition	Ac bus 1, 2, 3, or 4
Engine starters	Battery bus
Ignition P.S. control (Engines 2 and 3)	Battery bus
Ignition & tach pwr supply (Engines 2 and 3)	Battery bus
Thrust reverser emer stow	Ac bus 3
Reverse thrust	Dc bus 1 or 4

- (6) Open thrust reverser hydraulic system manual shutoff normal and emergency stow valves, located in left main gear wheel well. Safety valves in open position with lockwire.

WARNING: MAKE CERTAIN FLIGHT COMPARTMENT THRUST REVERSER LEVER POSITION CORRESPONDS WITH THRUST REVERSER TRANSLATING COWL POSITION AND THAT ALL PERSONNEL AND EQUIPMENT ARE WELL CLEAR OF THRUST REVERSERS ON ALL FOUR ENGINES BEFORE OPENING MANUAL SHUTOFF VALVES. INADVERTENT THRUST REVERSER OPERATION COULD RESULT IN DEATH OR SERIOUS INJURY TO PERSONNEL.

**CHAPTER**

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C H A P T E R 5 7

W I N G S

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HIGHLIGHTS

TO: ALL HOLDERS OF DC-8 SEVENTY SERIES MAINTENANCE MANUAL

CONCERNING: REVISION 19, CHAPTER 57, DATED: APR 1/88

57-CONT REVISED TO PROVIDE NEW GENERIC TABLE OF CONTENTS.

57-IDENT REVISED TO PROVIDE NEW GENERIC AIRPLANE IDENTIFICATION LIST.

MANUAL UPDATE INSTRUCTIONS

PLEASE INSERT REVISED AND NEW PAGES INTO THIS MANUAL IN ACCORDANCE WITH THE CURRENT LIST OF EFFECTIVE PAGES. ALL EXISTING PAGES IN YOUR MANUAL THAT ARE BEING REPLACED WITH REVISED PAGES ARE TO BE REMOVED FROM YOUR MANUAL.

AN (\*) ASTERISK IN FRONT OF AN ENTRY ON THE LIST OF EFFECTIVE PAGES INDICATES NEW OR REVISED PAGES.

A LIST OF PAGES DELETED BY THE CURRENT REVISION IS BEING FURNISHED AS A PART OF THE HIGHLIGHTS AND DELETED PAGES SHOULD BE REMOVED FROM YOUR MANUAL.

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LEADING EDGE VANES----- Maintenance Practices-----	57-20-5	201	CODE 50	ALL

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AIRPLANE IDENTIFICATION

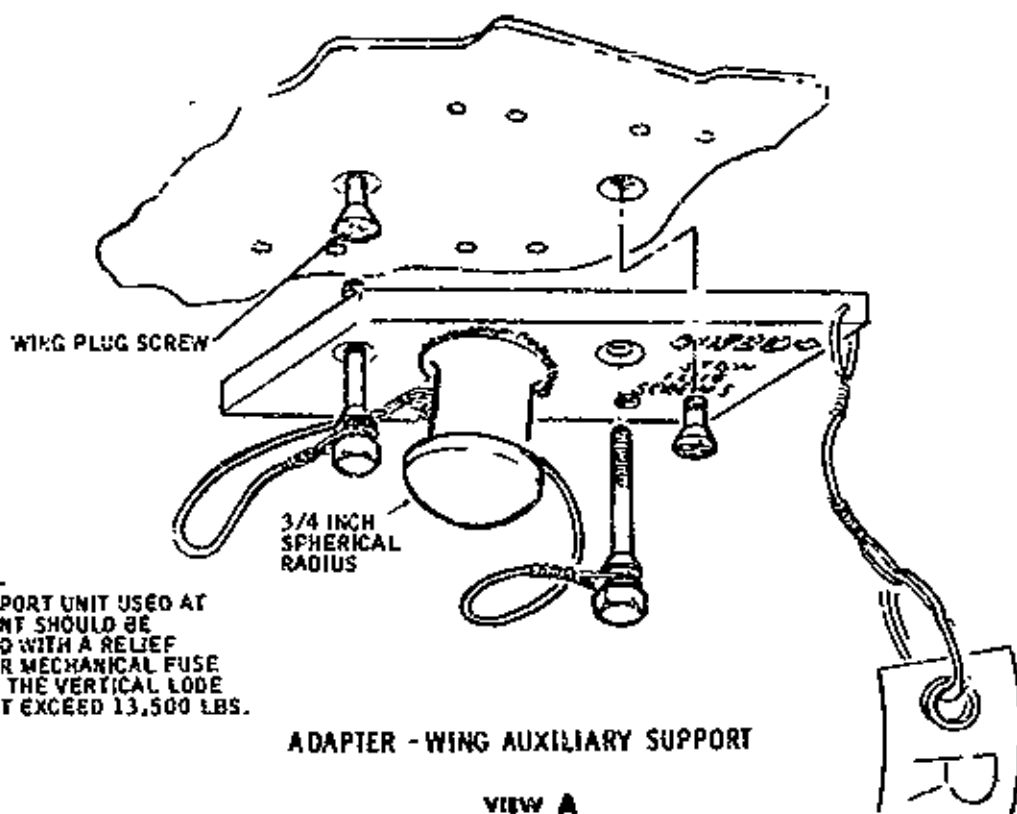
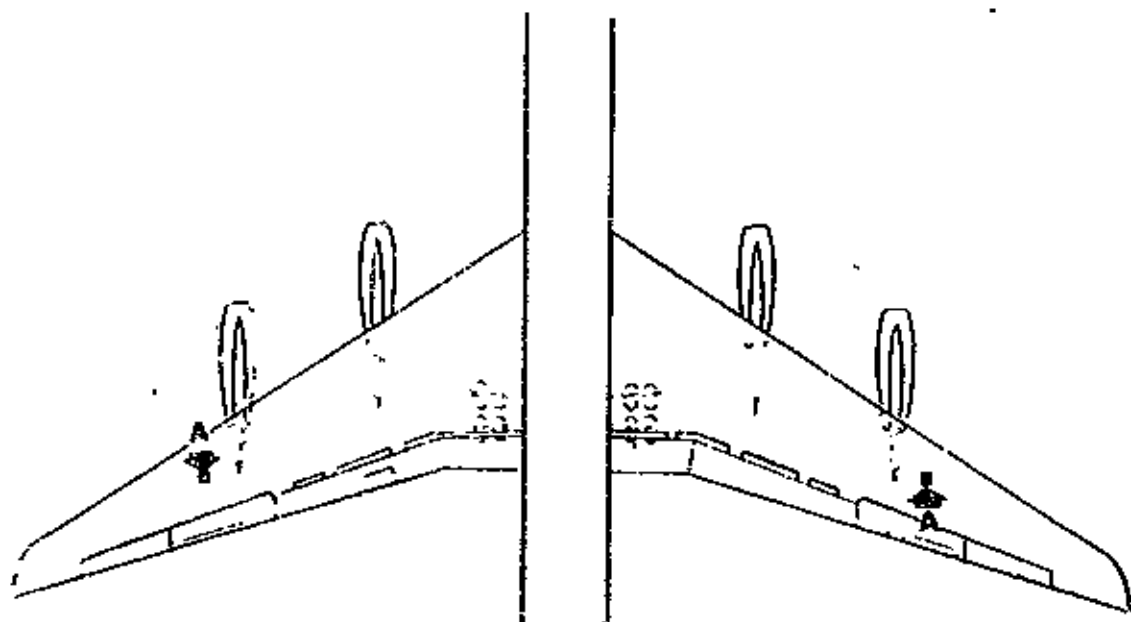
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DC8-71	45945	337
DC8-71	45946	339
DC8-71	45947	341
DC8-71CF	45948	321
DC8-71CF	45949	329
DC8-71CF	45950	354
DC8-71CF	45952	338
DC8-71	45963	355
DC8-73CF	45966	393
DC8-73CF	45967	385
DC8-73CF	45968	389
DC8-71	45970	343
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DC8-71	45976	372
DC8-71	45977	373
DC8-71	45978	381
DC8-71	45979	363

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DC8-71	46066	462
DC8-72	46067	455
DC8-71	46072	477
DC8-73CF	46073	485
DC8-73AF	46074	468
DC8-73	46076	451
DC8-73AF	46080	466
DC8-72	46081	471
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DC8-73CF	46087	454
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DC8-73CF	46090	504
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DC8-73CF	46094	482
DC8-73	46095	497
DC8-71	46099	507
DC8-73	46100	502
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DC8-73	46123	508
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DC8-73CF	46133	534
DC8-73CF	46135	531
DC8-73CF	46140	528
DC8-73CF	46149	538

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Wing Auxiliary Support Fitting  
 Figure 201

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**R B. Install Trough.**

- (1) Make certain that throttle/thrust reverser lever is tagged, and following circuit breakers are open and tagged:

NOTE: Numbering on circuit breaker panel denotes engine position.

Circuit Breaker	Section
Engine ignition	Ac bus 1, 2, 3, or 4
Engine starters	Battery bus
Ignition P.S. control (Engines 2 and 3)	Battery bus
Ignition & tach pwr supply (Engines 2 and 3)	Battery bus
Thrust reverser emer stow	Ac bus 3
Reverse thrust	Dc bus 1 or 4

- (2) Make certain thrust reverser hydraulic system manual shutoff normal and emergency stow valves, located in left main gear wheel well are closed.

- R** (3) Position trough.
- (4) Install attaching hardware.

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- (5) Remove tag from throttle/thrust reverser lever, and remove tags and close following circuit breakers:

NOTE: Numbering on circuit breaker panel denotes engine position.

Circuit Breaker	Section
Engine ignition	Ac bus 1, 2, 3, or 4
Engine starters	Battery bus
Ignition P.S. control (Engines 2 and 3)	Battery bus
Ignition & tach pwr supply (Engines 2 and 3)	Battery bus
Thrust reverser emer stow	Ac bus 3
Reverse thrust	Dc bus 1 or 4

- (6) Open thrust reverser hydraulic system manual shutoff normal and emergency stow valves, located in left main gear wheel well. Safety valves in open position with lockwire.

WARNING: MAKE CERTAIN FLIGHT COMPARTMENT THRUST REVERSER LEVER POSITION CORRESPONDS WITH THRUST REVERSER TRANSLATING COWL POSITION AND THAT ALL PERSONNEL AND EQUIPMENT ARE WELL CLEAR OF THRUST REVERSERS ON ALL FOUR ENGINES BEFORE OPENING MANUAL SHUTOFF VALVES. INADVERTENT THRUST REVERSER OPERATION COULD RESULT IN DEATH OR SERIOUS INJURY TO PERSONNEL.

**CHAPTER**

**57**

**WINGS**

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C H A P T E R 5 7

W I N G S



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HIGHLIGHTS

TO: ALL HOLDERS OF DC-8 SEVENTY SERIES MAINTENANCE MANUAL

CONCERNING: REVISION 19, CHAPTER 57, DATED: APR 1/88

57-CONT REVISED TO PROVIDE NEW GENERIC TABLE OF CONTENTS.

57-IDENT REVISED TO PROVIDE NEW GENERIC AIRPLANE IDENTIFICATION LIST.

MANUAL UPDATE INSTRUCTIONS

PLEASE INSERT REVISED AND NEW PAGES INTO THIS MANUAL IN ACCORDANCE WITH THE CURRENT LIST OF EFFECTIVE PAGES. ALL EXISTING PAGES IN YOUR MANUAL THAT ARE BEING REPLACED WITH REVISED PAGES ARE TO BE REMOVED FROM YOUR MANUAL.

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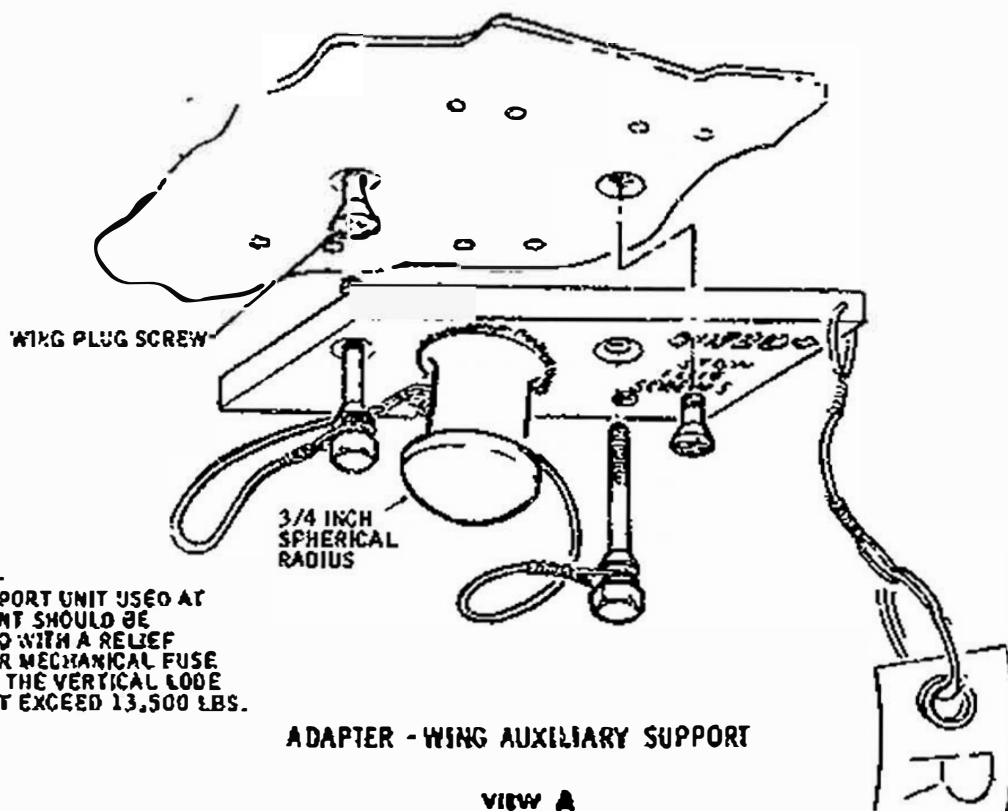
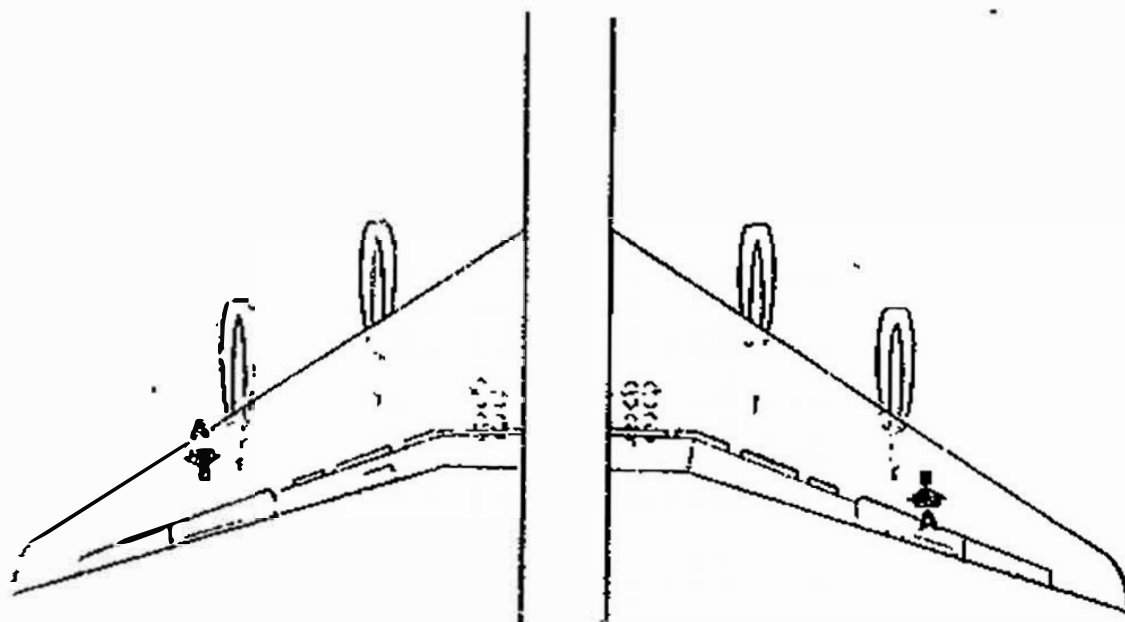
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Wing Auxiliary Support Fitting  
 Figure 201

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Item	Name	Number	Manufacturer	Use
C	Sling, leading edge double section	5710114	Aircraft Mechanics, Inc.,	Removing installing, and general handling of all leading edge double sections
D	Hydraulic jack	3933	Regent Jack Co., Downey, Calif.	Support and stabilize wing, when removing leading edge
or				
		39001001	Sancor Products, Hawthorne, Calif.	

**3. Removal/Installation Wing Inboard Leading Edge Sections**

**A. Remove Wing Inboard Leading Edge Sections as a Unit**

**NOTE:** It might be necessary when removing or installing leading edge sections to remove the droop from the wing by jacking at the wing auxiliary support.

- (1) Remove plug screws from lower wing panel outboard of outboard pylon.

**NOTE:** Stow plug screws in wing auxiliary support fitting to prevent loss of screws.

- (2) Install wing auxiliary support fitting on wing with attaching bolts supplied with adapter (see Figure 201).
- (3) Position hydraulic jack directly beneath wing auxiliary support fitting.

**CAUTION:** JACK MUST BE DESIGNED TO RELIEVE AT 13,500 POUNDS (6129 KG), TO PREVENT DAMAGE TO WING STRUCTURE.

- (4) Extend jack screw extension until extension is snug against fitting.

**WARNING:** WHEN USING JACK SCREW EXTENSION, MAKE CERTAIN EXTENSION IS NOT EXTENDED BEYOND SAFE THREAD ENGAGEMENT (THREE TO FOUR THREADS MINIMUM) TO PREVENT JACK FROM COLLAPSING, RESULTING IN INJURY TO PERSONNEL AND DAMAGE TO AIRPLANE.